MINERALOGICAL ABSTRACTS

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Notices of Books.

WINCHELL (N. H.) [1839–1914] & WINCHELL (A. N.). *Elements of optical mineralogy: an introduction to microscopic petrography.* Second edition by Alexander N. WINCHELL. *Part II, Descriptions of minerals, with special reference to their optic and microscopic characters.* New York (John Wiley & Sons) and London (Chapman & Hall), 1927, xvi + 424 pp., 333 figs. Price $5·50 (27*s.* 6*d.*).

The first part of this second edition was published in 1922 [M.A. 2–2]. In the first edition of 1909 the minerals in the descriptive portion were arranged alphabetically; they are now arranged on a chemical classification more or less following Dana. All the available optical data have been collected from various sources; and when these have not been tabulated in previous compilations, references are given to the recent literature. 'Microscopic petrography' on the title-page would suggest that only rock-forming minerals are included (65 pages are devoted to the felspars), but the optical data of all minerals known up to date are quoted, so producing a valuable book of reference. Refractive indices are quoted to three places of decimals for sodium-light. Sketches showing the optical orientation of the crystals of each species are freely given; and there are many diagrams plotting the variations of the optical characters with the chemical composition, several of which are taken from the author's recent papers. L. J. S.

RIES (Heinrich). *Clays, their occurrence, properties, and uses, with special reference to those of the United States and Canada.* Third edition. New York (John Wiley & Sons) and London (Chapman & Hall), 1927, vii + 613 pp., 173 figs. Price $7·00 (35*s.*).

The first edition of this book appeared in 1906 and the second in 1908. Although the sections on the mining of clays and the manufacture of clay products are now omitted, yet the book shows an increase of sixty pages on the previous edition. It forms an exhaustive treatise on the origin and occurrence of clay; the constituent minerals and their properties, including kaolin, halloysite, montmorillonite, beidellite, allophane, leverrierite, gibbsite, diaspore, quartz, felspar, mica, iron

hydroxides, &c.; the chemical and physical properties of clay; kinds of clays, including bentonite (9 pp.) and fuller's earth (16 pp.); and the distribution of clays in the United States and in Canada. Numerous chemical analyses and data are quoted, and there are full references to the voluminous literature. The book is well printed on heavy (evidently clay-loaded) paper, and is well illustrated. L. J. S.

Geometrical Crystallography.

Becke (F.). *Systematik der 32 Symmetrieklassen der Kristalle.* Fortschr. Min. Krist. Petr., 1927, vol. 11, pp. 289–290; [reprinted in] Centralblatt Min., Abt. A, 1926, pp. 368–370; Zeits. Krist., 1926, vol. 64, pp. 511–513.

—— *Vorschläge zur Systematik und Nomenklatur der 32 Symmetrieklassen.* Fortschr. Min. Krist. Petr., 1927, vol. 12, pp. 97–106.

Arising out of a suggestion for the international agreement in crystallographical nomenclature (Min. Mag., 1925, vol. 20, p. 353) a committee was appointed in 1926 by the German Mineralogical Society to consider this question, and the following papers are the results so far obtained.[1]

F. Becke, by a modification of Tschermak's grouping based on the symmetry-elements, arrives at the following symmetry-classes:

System.	I. Polar (p omitted).	II. Central.	III. Axial.	IV. Sympolar.	V. Holohedral.	Ia. Inversion-axial.	IVa. Inversion-axial symmetric.
Triclinic and Monoclinic ...	T	Tc	Ma	Ms	Mh	—	—
Rhombic	—	—	Oa	Os	Oh	—	—
Trigonal	R	Rc	Ra	Rs	Rh	—	—
Tetragonal	Q	Qc	Qa	Qs	Qh	Qi	Qis
Hexagonal	H	Hc	Ha	Hs	Hh	Hi	His
Tesseral	K	Kc	Ka	Ks	Kh	—	—

L. J. S.

[1] Berichte der Kommission der Deutschen Mineralogischen Gesellschaft betreffend die kristallographische Systematik, Bezeichnung und Benennung. Fortschr. Min. Krist. Petr., 1927, vol. 12, pp. 97–118. [Papers by F. Becke, F. Rinne, and E. Schiebold.]

RINNE (F.). *Diskussion zum Vortrag Becke.* Fortschr. Min. Krist. Petr., 1927, vol. 11, pp. 290–292; Centralblatt Min., Abt. A, 1926, pp. 370–372; Zeits. Krist., 1926, vol. 64, pp. 513–514.

RINNE (Friedrich). *Bemerkung[en] zur kristallographischen Nomenklatur.* Fortschr. Min. Krist. Petr., 1927, vol. 12, pp. 107–111; Centr. Min., A, 1928, pp. 49–53; Zeits. Krist., 1928, vol. 66, pp. 467–471.

The rhythm of the symmetry-axes gives the following grouping of the 32 crystal-classes; and the classes are named accordingly, e.g. digyral sphenoidal (2s), trigyral pedial (3p), tetragyral pinakoidal (4pi), hexagyral domatic (6d), cubic prismatic (t(sd)), hexagyroidal domatic ($\acute{6}$d).

System.	Gyral derivation.					Centro-gyroidal derivation.	
	1. Pedial.	2. Pinakoidal.	3. Sphenoidal.	4. Domatic.	5. Prismatic.	1a. Pedial.	4a. Domatic.
Triclinic and Monoclinic...	p	pi	s	d	(sd)	—	—
Rhombic	—	—	2s	2d	2(sd)	—	—
Trigonal	3p	3pi	3s	3d	3(sd)	—	—
Tetragonal	4p	4pi	4s	4d	4(sd)	$\acute{4}$p	$\acute{4}$d
Hexagonal	6p	6pi	6s	6d	6(sd)	$\acute{6}$p	$\acute{6}$d
Cubic	tp	tpi	ts	td	t(sd)	—	—

L. J. S.

SEN (Janshi). *Natural arrangement in crystal symmetry.* Pan-Amer. Geologist, 1924, vol. 42, pp. 331–334.

The symbols used for the 32 classes of crystal symmetry are those of J. W. Evans [M.A. **3**-418] and the names and statement of the elements of symmetry are those adopted by A. F. Rogers (1921). The order in which the classes are arranged in each system is according to the 'hedrocyclic' or face-cycle ratio, i.e. the ratio of the number of faces of the general form of a class to the cyclic number of the principal axis of symmetry. This ratio varies from 1 to 4. L. J. S.

NIGGLI (Paul). *Der rhombisch holoedrisch deformierte Gitterkomplex der dichtesten hexagonalen Kugelpackung.* Zeits. Krist., 1926, vol. 64, pp. 357–372, 4 figs.

The author considers the problem of finding the space-groups of the class V_h in which a group of equivalent atoms can be deformed so as to give closest hexagonal packing. Two methods of solutions are given.

For four atoms the relevant groups in the class V_h are 5, 6, 11, 12, 13, 14, 16 (twice). For sixteen atoms in general positions the groups are 14 and 15; if eight atoms are in general positions, the groups are 6, 8, 9, 10, 12, 14, 16 (twice). H. H.

Schiebold (E.). *Über eine neue Herleitung und Benennung der 230 Raumgruppen.*[1] Fortschr. Min. Krist. Petr., 1927, vol. 12, pp. 112–118; Centr. Min., A, 1928, pp. 41–48; Zeits. Krist., 1928, vol. 66, pp. 471–477.

The method and nomenclature of F. Rinne for the 32 crystal-classes is followed in deriving the 230 space-groups from the primary forms. The 15 triclinic and monoclinic space-groups and a few others are given as examples.

Schoenflies's symbol.	New symbol.	Translation-group and derivation.
C_1	p	Γ_{tr}-pedial or Γ_{tr}-transpedial.
C_i	pi	Γ_{tr}-pinakoidal or Γ_{tr}-transpinakoidal.
C_2^1	s	Γ_m-sphenoidal.
C_2^2	$\tilde{s}$	Γ_m-helicoidal.
C_2^3	s′	Γ'_m-sphenoidal or Γ_m-trans-sphenoidal.
C_s^1	d	Γ_m-domatic.
C_s^2	δ	Γ_m-domatoidal.
C_s^3	d′	Γ'_m-domatic or Γ_m-transdomatic.
C_s^4	δ′	Γ'_m-domatoidal or Γ_m-transdomatoidal.
C_{2h}^1	(sd)	Γ_m-gyrodomatic (or prismatic).
C_{2h}^2	($\tilde{s}$d)	Γ_m-helicodomatic.
C_{2h}^3	(sδ)	Γ_m-gyrodomatoidal.
C_{2h}^4	($\tilde{s}$δ)	Γ_m-helicodomatoidal.
C_{2h}^5	(sd)′	Γ'_m-gyrodomatic or Γ_m-transgyrodomatic.
C_{2h}^6	(sδ)′	Γ'_m-gyrodomatoidal or Γ_m-transgyrodomatoidal.
V_h^1	2(sd)	Γ_o-digyral-gyrodomatic (or prismatic).
D_3^2	3s	Γ_h-trigyral-sphenoidal.
V_h^{17}	$\tilde{2}'$(sd)	Γ'_o-dihelical-gyrodomatic (or prismatic).
C_4^4	($\frac{3}{4}\tilde{4}$)p	Γ_t-$\frac{3}{4}$ tetrahelical pedial.
C_{2v}^3	$2\delta_p$	Γ_o-digyral-paradomatoidal.
C_{2v}^4	$2\delta_o$	Γ_o-digyral-orthodomatoidal.
C_{2v}^6	$2\delta_k$	Γ_o-digyral-clinodomatoidal.
V_h^{16}	$\tilde{2}(\tilde{s}^{\frac{1}{4}}\delta_k^{\frac{1}{4}})$	Γ_o-dihelical-helico-clinodomatoidal ($\frac{1}{4}$), [$\frac{1}{4}$].

L. J. S.

[1] The full paper with figs. will appear in Abhandl. Sächs. Akad. Wiss., math.-naturw. Kl., 1928.

BECKENKAMP (J.). *Der Kristall als homogenes Polyeder.* Neues Jahrb. Min., Abt. A, 1926, Beilage-Band 54, pp. 1–71, 37 figs. [See M.A. 3-67.]

—— *Der Kristall als homogenes Polyeder und die Beziehungen der physikalischen Eigenschaften der Kristalle zu den einzelnen Gruppen der geometrischen Kristallographie.* Zeits. Physik, 1926, vol. 40, pp. 237–254.

—— *Bemerkungen zur analytischen und synthetischen Ableitung der 32 Symmetrieklassen.* Centralblatt Min., Abt. A, 1927, pp. 113–117, 1 fig.

Axes of rotation L^{I} of 360°, L^{II} of 180°, &c., are of two kinds; the second kind, involving an alternating reflection or an inversion-centre, being distinguished as $*L^{I}$, $*L^{II}$, &c. The 32 symmetry-classes are derived as follows [names and symbols are separated from the table to save space]:

Symmetry-system.	Symmetry-factor an axis of the first kind.					Symmetry factor an axis of the second kind.	
	a. Pedial.	b. Sphenoidal.	c. Domatic.	d. Pinakoidal.	e. Prismatic.	*a. Pedial.	*c. Domatic.
Monogonal ...	1	—	—	2	—	—	—
Monodigonal ...	—	3	4	—	5	—	—
Triakisdigonal ...	—	6	7	—	8	—	—
Monotrigonal ...	9	10	11	12	13	—	—
Monotetragonal...	14	15	16	17	18	19	20
Monohexagonal...	21	22	23	24	25	26	27
Tetrakistrigonal	28	29	30	31	32	—	—

1, pedial (L^{I}. L^{I}). 2, pinakoidal ($*L^{II}$. L^{I}). 3, sphenoidal (L^{II}. L^{I}). 4, domatic ($*L^{I}$. L^{I}). 5, prismatic ($*L^{I}$. $*L^{II}$. L^{I}). 6, clinodisphenoidal (L^{II}. L^{II}). 7, triakis-digonal-pyramidal ($*L^{I}$. L^{II}). 8, triakis-digonal-dipyramidal ($*L^{I}$. $*L^{II}$. L^{II}). 9, trigonal-pyramidal (L^{I}. L^{III}). 10, trigonal-trapezohedral (L^{II}. L^{III}). 11, ditrigonal-pyramidal ($*L^{I}$. L^{III}). 12, rhombohedral ($*L^{II}$. L^{III}). 13, ditrigonal-scalenohedral ($*L^{I}$. $*L^{II}$. L^{III}). 14, tetragonal-pyramidal (L^{I}. L^{IV}). 15, tetragonal-trapezohedral (L^{II}. L^{IV}). 16, ditetragonal-pyramidal ($*L^{I}$. L^{IV}). 17, tetragonal-dipyramidal ($*L^{II}$. L^{IV}). 18, ditetragonal-dipyramidal ($*L^{I}$. $*L^{II}$. L^{IV}). 19, orthodisphenoidal (L^{I}. $*L^{IV}$). 20, didigonal-scalenohedral ($*L^{I}$. $*L^{IV}$). 21, hexagonal-pyramidal (L^{I}. L^{VI}). 22, hexagonal-trapezohedral (L^{II}. L^{VI}). 23, dihexagonal-pyramidal ($*L^{I}$. L^{VI}). 24, hexagonal-dipyramidal ($*L^{II}$. L^{VI}). 25, dihexagonal-dipyramidal ($*L^{I}$. $*L^{II}$. L^{VI}). 26, trigonal-dipyramidal (L^{I}. $*[L^{2\cdot 2\pi}]^{VI}$). 27, ditrigonal-dipyramidal ($*L^{I}$. $*[L^{2\cdot 2\pi}]^{VI}$). 28, tetrahedral-pentagonal-dodecahedral (L^{I}. $4L^{III}$). 29, pentagonal-icositetrahedral (L^{II}. $4L^{III}$). 30, hexakis-tetrahedral ($*L^{I}$. $4L^{III}$). 31, dyakis-dodecahedral ($*L^{II}$. $4L^{III}$). 32, hexakis-octahedral ($*L^{I}$. L^{II}. $4L^{III}$).

L. J. S.

WHERRY (Edgar T.). *Names for the symmetry-classes based on axes.* Amer. Min., 1927, vol. 12, pp. 218–220.

CUBIC SYSTEM.

Holosymmetric (fluorite).
Holoaxial (cuprite).
Alternating (pyrite).
Alternating-polar (blende).
Digonal-polar (ullmannite).

TETRAGONAL SYSTEM.

Tetragonal subsystem.—

Holosymmetric (anatase).
Polar ($AgF.H_2O$).
Holoaxial ($NiSO_4.6H_2O$).
Monoaxial (scheelite).
Monoaxial-polar (wulfenite).

Alternating subsystem.—

Alternating (chalcopyrite).
Alternating-monoaxial (meliphane).

HEXAGONAL SYSTEM.

Alternating subsystem.—

Alternating (calcite).
Alternating monoaxial (dolomite).

Hexagonal subsystem.—

Holosymmetric (beryl).
Polar (iodyrite).
Holoaxial (β-quartz).
Monoaxial (apatite).
Monoaxial-polar (nepheline).

Trigonal subsystem.—

Holosymmetric (benitoite).
Polar (tourmaline).
Holoaxial (quartz).
Monoaxial (?).
Monoaxial-polar ($NaIO_3.3H_2O$).

RHOMBIC SYSTEM.

Holosymmetric (baryte).
Polar (hemimorphite).
Holoaxial (epsomite).

MONOCLINIC SYSTEM.

Holosymmetric (gypsum).
Holoaxial polar ($Li_2SO_4.H_2O$).
Anaxial (clinohedrite).

TRICLINIC SYSTEM.

Holosymmetric (chalcanthite).
Asymmetric ($CaS_2O_3.6H_2O$).

L. J. S.

EVANS (John W.). *The thirty-two classes of crystal symmetry.* Nature London, 1924, vol. 113, pp. 80–81.

The table given is a modification of those previously given in Min. Mag., 1907, vol. 14, p. 360 and 1910, vol. 15, p. 398. It also appeared in the author's 'Elementary crystallography', 1924 [M.A. 2-241].

L. J. S.

SWARTZ (J. H.). *A simple proof of the law that the only possible periods of crystal symmetry are 1, 2, 3, 4 and 6.* Zeits. Krist., 1927, vol. 66, pp. 309–314, 4 figs.

The proof of this well-known theorem here given is based on structure theory.

H. H.

TERPSTRA (P.). *Notiz zur geometrischen Bedingung für die Entstehung von Kombinationen.* Zeits. Krist., 1927, vol. 66, p. 317.

An extension of Borgström's table [M.A. 3-66] for determining the occurrence of combinations.

H. H.

CHUDOBA (Karl). *Zwillingspersistenzen.* Zeits. Krist., 1927, vol. 65, pp. 722–728.

The 'persistence' of a property of a crystalline species is the ratio of the number of crystals having this property to the total number of crystals observed. The author considers the persistence of twins, and extends Tokody's work [M.A. 3–242]. H. H.

RABINOWITSCH (Bruno) & WEISSENBERG (Karl). *Zusammenstellung von Druckfehlern in R. W. G. Wyckoff, » The analytical expression of the results of the theory of the space-groups «. (Carnegie Institution of Washington, Washington, 1922).* Zeits. Krist., 1927, vol. 66, pp. 171–172.

The authors calculated afresh the co-ordinates of equivalent points in space-groups, and found 25 errors in Wyckoff's book, to which they call attention. H. H.

ROGERS (Austin F.). *The addition and subtraction rule in geometrical crystallography.* Amer. Min., 1926, vol. 11, pp. 303–315.

An elementary explanation with illustrative examples of the well-known relation that $(mh \pm np, mk \pm nq, ml \pm nr)$ are indices of faces in the zone $[hkl, pqr]$. The application of this in the orthographic drawings of crystals is pointed out. L. J. S.

RINNE (Friedrich). *Ein stereographisch-gnomonisches Doppelnetz.* Zeits. Krist., 1927, vol. 65, pp. 83–84, 1 pl. [See M.A. 3–240.]

Crystal-optics.

BECKE (F.). *Über Grau- und Farbstellung bei gedrehter[,] horizontaler und asym[m]etrischer Dispersion der optischen Achsen.* Anzeiger Akad. Wiss. Wien, Math.-naturwiss. Kl., 1921, pp. 2–3.

A borax plate $\perp Bx_a$ in the konoscope shows in the normal position coloured borders to the brushes. When the section is rotated clockwise through 25° these colours disappear. This is called the 'grey position' (Graustellung); and twice this angle, the 'grey angle' (Grauwinkel), is the angle between the optic axial plane and the locus of the poles of the optic axis for different colours. In the 'colour position' (Farbstellung), at 45° to the 'grey position', the coloured borders to the brushes are at their brightest. With borax (crossed dispersion) the brushes of both optic axes come into the 'grey position' simultaneously. With sanidine (horizontal dispersion) the 'grey position' for one axis is obtained by a rotation clockwise of 8°, and for the other axis by a rotation counter-clockwise of 8°. With copper-vitriol (asymmetric dispersion) the 'grey

angles' for the two axes are 44° (= 22° × 2) and 74° (= 37° × 2) respectively. With orthorhombic crystals and monoclinic crystals with inclined dispersion the 'grey position' coincides with the normal position and the 'colour position' with the usual diagonal position. This method can be used for determining the positions of the optic axes for different colours.

L. J. S.

Bräutigam (Fritz). *Die Dispersion der Achsen des Orthoklases.* Tschermaks Min. Petr. Mitt., 1922, vol. 35 (for 1921), pp. 231–244, 5 figs.

Detailed optical determinations, with special reference to the positions of the optic axes for light of different colours, are given for adularia from Maderanerthal and St. Gotthard in Switzerland and for moonstone from Ceylon. Plates cut nearly perpendicular to one optic axis were used under the microscope for determining the exact position of the axis for different colours, the method of the 'grey position' (Graustellung) of F. Becke [preceding abstract] being employed. The positions are expressed as angular co-ordinates λ and ϕ [in this case $\lambda = c : a$ giving the extinction-angle on (010), and $\phi = V$, half the optic axial angle]. The data obtained for adularia from Maderanerthal are :

$\lambda_{\mu\mu}$	a.	β.	γ.	λ [$= c : a$].	ϕ [$= V$].
687 ...	1·51418	1·51804	1·52058	+69° 54·4′	−33° 23·7′
589 ...	1·51727	1·52168	1·52346	70 7·9	33 8·3
559 ...	1·518	1·52248	1·52445	70 16·0	33 1·5
517 ...	1·52027	1·52479	1·52627	70 25·7	33 53·5
460 ...	—	(1·5292	—	70 43·3	32 31·9

L. J. S.

Chudoba (Karl). *Die Dispersion der Plagioklase. Albit und Anorthit.* Sitzungsber. Akad. Wiss. Wien, Math.-naturw. Kl., 1925, Abt. 1, vol. 134, pp. 159–188, 18 figs.

—— *Zur Dispersion der Plagioklase.* Fortschr. Min. Krist. Petr., 1927, vol. 11, pp. 49–56, 1 fig.

Plates of albite from Rischuna, Switzerland, and of anorthite from Vesuvius cut nearly perpendicular to each of the two optic axes were used for determining the positions of the axes for light of different colours. The positions of the axes were measured under the microscope using the 'Graustellung' method of F. Becke, and their angular co-ordinates are plotted on a stereographic projection. On the same projection are also plotted the positions of the optic axes for different colours determined for oligoclase and andesine by S. Tsuboi (Min. Mag., 1923, vol. 20, p. 93).

L. J. S.

[Sushchinsky (P. P.) & Puzyrev (G. L.).] Сущинский (П. П.) и Пузырев (Г. Л.). К методике определения плагиоклазов по способам Федорова и Фуке.—Suščinskij (P. P.) & Puzyrĭev (G. L.). *Sur la méthode de définition des plagioclases d'après les procédés de Fedorov et de Fouqué.* Труды Геол. Мин. Музея Петра Великого, Акад. Наук, Ленинград (Trav. Mus. Géol. Min. Pierre le Grand, Acad. Sci. Leningrad), 1926, vol. 5, livr. 7, pp. 199–232, 1 pl., 3 text-figs.

This paper, written in 1921, outlines and contrasts the methods of Fouqué and of Fedorov for the optical determination of the plagioclases. Much of the matter and the figures are taken from the works of M. A. Usov (Tomsk, 1910) and V. V. Nikitin. Usov gave for plagioclase fifteen twin-laws, four of which are not accepted by Nikitin. It is emphasized that lamellar twinning may be on other laws besides the albite-law, e.g. on the Roc Tourné law with twin-axis $\perp$ (100) and $\parallel$ (010). In sections $\perp \gamma$ the (001) cleavage may be incorrectly orientated; and further there may be a confusion with the secondary cleavages (110) or (111), which are occasionally sharply developed, or with accidental cracks. Examples are given showing that in such cases the Fouqué method may lead to error, and that a correct determination can be made only by the Fedorov method. Further, the Fouqué method takes more time and is more tedious. P. N. C.

Rösch (S.) & Stürenburg (M.). *Ein Diagramm für optische Achsenwinkel.* Zeits. Krist., 1927, vol. 65, pp. 588–602, 2 figs.

The tangent of half the angle between the optic axes is $(\gamma/\alpha)\,(\beta^2-\alpha^2)^{\frac{1}{2}}\,(\gamma^2-\alpha^2)^{-\frac{1}{2}}$, and the tangent of half the angle between the ray axes is $(\beta^2-\alpha^2)^{\frac{1}{2}}\,(\gamma^2-\alpha^2)^{-\frac{1}{2}}$, where α, β, γ are the principal refractive indices. The problem of obtaining these angles graphically when the values of α, β, γ are known is considered, and a diagram is given by means of which the problem may be reduced to the case in which $\alpha = 1$. The values of the angles are tabulated for various values of β and γ (with $\alpha = 1$), from which a diagram for graphical solution can readily be constructed. H. H.

Haase (Max). *Messung und Vergleich der optischen Eigenschaften der hochlichtbrechenden, isostrukturellen Verbindungen von Mg, Ca, Sr, Ba mit O, S, Se und Te.* Zeits. Krist., 1927, vol. 65, pp. 509–587, 12 figs.

An exhaustive investigation was undertaken of the refractive indices of the oxides, sulphides, selenides, and tellurides of magnesium, calcium,

strontium, and barium, with the exception of MgTe. The dispersion for wave-lengths 656 to 535 was also obtained for CaO, SrO, BaO; CaS, SrS; CaSe, SrSe, BaSe; SrTe, BaTe. The Debye-Scherrer method was used to verify the hexagonal structure of beryllium oxide (BeO), and to find a halite structure for BaTe with $a = 6{\cdot}82$ Å. H. H.

Haase (M.). *Die Dispersion vom Magnesiumsulfid.* Zeits. Krist., 1927, vol. 66, pp. 236–238.

The earlier work of the author (preceding abstract) has been completed by the determination of the refractive index of MgS as 2·258, 2·266, 2·277, 2·284 for wave-lengths 640, 615, 570, 540 $\mu\mu$, respectively. H. H.

Laski (Gerda). *Die ultraroten Reflexionsspektren von $NaClO_3$ und $NaBrO_3$.* Zeits. Krist., 1927, vol. 65, pp. 607–614, 3 figs.

The infra-red reflection-spectrum of $NaClO_3$ and $NaBrO_3$ was measured in the range 20–120 μ. In addition to the two known natural frequencies of vibration of the negative ClO_3 radical, a third was found at wave-length 25 μ, and for BrO_3 a third was found at 23 μ. For both substances a wide range of high reflection was obtained which reaches its maximum at about 80 μ. H. H.

Finkelnburg (Wolfgang). *Untersuchung über die Absorption einiger Glimmersorten im ultravioletten Licht.* Neues Jahrb. Min., Abt. A, 1926, Beil.-Bd. 55, pp. 144–148, 1 pl., 1 text-fig.

Absorption spectra for ultra-violet and visible rays ($\lambda = 2700$–7000 Å.) are given for different trade samples of mica. L. J. S.

Jones (W. R.) & Brammall (A.). *Polarisation colour scale.* London (J. Swift & Son), [1927], 6 pp., 10 × 4 cm. Price 1*s.* 6*d.*

Two strips showing first to fourth order colours are mounted side by side so that the colours seen between crossed and parallel nicols fall together, and the corresponding relative retardation is indicated on a $\mu\mu$ scale. Brief instructions are given of how to determine the thickness of a section from the birefringence of a known mineral, and thence to determine the birefringence of an unknown mineral. A table of birefringences of rock-forming minerals and other items of information useful to students are given. L. J. S.

X-rays and Crystal-structure.

Laue (M. vi). *Der Einfluß der Temperatur auf die Röntgenstrahl-interferenzen.* Zeits. Krist., 1927, vol. 65, pp. 493–496.

An epitome of a paper by the author in Annalen der Physik, 1926, vol. 81, p. 877, on the mathematical theory of the influence of temperature on X-ray interference. H. H.

Ott (H.). *Zur Methodik der Strukturanalyse.* Zeits. Krist., 1927, vol. 66, pp. 136–153.

A general mathematical method is given which enables the author to determine in certain cases the positions of the atoms of a lattice from the interference of Röntgen rays independently of any structure theory, or at any rate to approximate closely to those positions. The method is illustrated by an application to graphite and the three modifications of carborundum. H. H.

Winchell (A. N.). *"Finger prints" of minerals.* Amer. Min., 1927, vol. 12, pp. 261–262.

A reference collection of the X-ray powder patterns of chemically analysed samples has been commenced in the Department of Geology of the University of Wisconsin. A list of minerals represented in this collection is given. L. J. S.

Tertsch (H.). *Bemerkungen zur Spaltbarkeit.* Zeits. Krist., 1927, vol. 65, pp. 712–718.

A more accurate calculation [M.A. 2–17] of the electrostatic forces of attraction and repulsion between the atoms leads to numerical limits which should obtain for the association of a given cleavage form with a given space-lattice. These limits are shown to be the ratios of the numbers of external or 'valency electrons' of the ionized atoms making up the lattice. Ionized caesium and chlorine atoms possess respectively 54 and 18 such electrons. The ratio $54/18 = 3$ falls within the limits calculated for the association of a cubic cleavage with a cube-centred lattice. Similarly is explained the cleavage form of all the halides of the alkali metals excepting CsBr and CsI, but the corrected formula is less successful in interpreting the results for zinc-blende and rutile.

F. A. B.

Jung (H.). *Über Arsen und Phosphor.* Centralblatt Min., Abt. A, 1926, pp. 107–114.

The several allotropic forms of arsenic (grey, yellow, brown, and black) were examined by the X-ray powder method. Grey native

arsenic has a unit rhombohedral cell of edge $a = 5{\cdot}599$ Å. and angle $\alpha = 84° 18'$, containing eight atoms; the others are amorphous. The fibrous-platy arsenolamprite from Copiapó, Chile, and Marienberg, Saxony, shows a pattern somewhat similar to that of native arsenic; and it may be impure native arsenic or perhaps a modification analogous to black phosphorus [M.A. 3–17]. Red phosphorus is not cubic as stated by S. Olshausen [M.A. 3–16]. L. J. S.

Jaeger (F. M.), Terpstra (P.), & Westenbrink (H. G. K.). *Die Kristallstruktur des metallischen Galliums.* Zeits. Krist., 1927, vol. 66, pp. 195–216, 6 figs.

Gallium was obtained as ditetragonal bipyramidal crystals with $c/a = 1{\cdot}6753$. Rotation and powder X-ray methods gave a unit cell of dimensions $a = 4{\cdot}51$ and $c = 7{\cdot}51$ Å., containing eight atoms of gallium. The space-group is probably D_{4h}^{18}. H. H.

Friauf (James B.). *The crystal structure of magnesium dizincide.* Physical Rev., 1927, ser. 2, vol. 29, pp. 34–40, 1 fig.

The symmetry of this substance is hexagonal, with space group D_{6h}^4. In the unit cell of dimensions $a = 5{\cdot}15$ and $c = 8{\cdot}48$ Å. there are four molecules of $MgZn_2$. Distances are as follows: $d_{(Mg-Mg)} = 3{\cdot}15$, $d_{(Zn-Zn)} = 2{\cdot}52$, and $d_{(Zn-Mg)} = 3{\cdot}02$ Å. H. E. B.

Jones (W. Morris) & Evans (E. J.). *The crystal structure of Cu_3Sn* [i.e. Cu_3Sn], *and Cu_3Sb.* Phil. Mag., 1927, ser. 7, vol. 4, pp. 1302–1311, 1 fig.

Powder photographs of these two compounds show them to be hexagonal with lattice dimensions and density as follows:

	a.	*c.*	*c/a.*	*D.*
Cu_3Sn	2·749Å.	4·322Å.	1·572	8·998
Cu_3Sb	2·777	4·367	1·572	8·636

The structure seems to be an hexagonal close-packed one, similar to that of the metals Mg, Zn, &c. In the unit cited above there is only $\frac{1}{2}$ molecule, but no trace of lines corresponding to a larger unit can be found. A further study of a compound Cu_3P is expected to shed some light upon this point. The density of each compound is greater than that of either constituent metal. H. E. B.

Forster (R.). *Das Raumgitter von Permalloy.* Physik. Zeits., 1926, vol. 27, pp. 829–830.

Permalloy, of composition 78 % Ni and 22 % Fe, is a face-centred cubic with $a = 3{\cdot}56$ Å. This is in good agreement with $a = 3{\cdot}54$ Å. for pure

nickel, 3·60 Å. for a 30 % Fe alloy, and 3·63 A. (after temperature correction) for pure γ-iron. In these examples, the lattice constant increases additively in going from pure nickel to pure iron. H. E. B.

Seljakow (N.), Kurdumoff (J.), & Goodtzov (N.). *Tetragonal structure of carbon steel.* Nature, London, 1927, vol. 119, p. 494.

Seljakow (N.), Kurdjumow (G.), & Goodtzow (N.). *Eine röntgenographische Untersuchung der Struktur des Kohlenstoffstahls.* Zeits. Physik, 1927, vol. 45, pp. 384–408, 19 figs.

The authors point out the existence of a body-centred tetragonal structure in hardened carbon-steel. The parameters of this structure vary only slightly from those of α-iron, and change with increase in the carbon content and with a rise in the temperature of hardening. The suggestion is that this body-centred tetragonal structure is a solid solution of carbon-steel in α-iron. During the hardening process, it is thought that there is a transition state formed between the α- and γ-modifications of iron. H. E. B.

Dehlinger (Ulrich). *Über die Verbreiterung der Debyelinien bei kaltbearbeiteten Metallen.* Zeits. Krist., 1927, vol. 65, pp. 615–631, 10 figs.

The separation of the Cu-K doublet is not effected by silver, copper, tantalum, and α-brass worked in the cold, though it is by aluminium and zinc. It is suggested that periodic deformation of the lattice is the cause of the widening and consequent fusion of the lines of the doublet, and the whole problem is subjected to exhaustive mathematical investigation. H. H.

Hermann (Carl). *Über das Gitter des Calciumcarbides.* Zeits. Krist., 1927, vol. 66, pp. 314–316, 2 figs.

A discussion of the work of Dehlinger and Glocker [M.A. 3–245], and of Weissenberg [M.A. 3–16] on the structure of CaC_2 and its comparison with FeS_2. H. H.

Ooé (Zirô). *The crystal structure of stibnite, I.* [Japanese.] Japanese Journ. Geol. Geogr., [1927], vol. 4 (for 1925), Abstracts p. (21) [from Journ. Geol. Soc. Tokyo, 1926, vol. 33, pp. 187–204].

X-ray examination of crystals of stibnite from Ichinokawa, Shikoku, gave for a unit cell containing 4 mol. Sb_2S_3 the dimensions $a = 11{\cdot}16$, $b = 11{\cdot}25$, $c = 3{\cdot}80$ Å., and the space-group V_h^{16}. This corresponds with the axial ratios $a : b : c = 0{\cdot}992 : 1 : 0{\cdot}338$, with c one-third the

usual crystallographic value; corresponding with the (001) spacing given by spectrometer measurements, and giving simpler indices for the Laue spots as well as for the natural crystal-faces. L. J. S.

Gottfried (Carl). *Über die Struktur des Antimonits.* Zeits. Krist., 1927, vol. 65, pp. 428–434.

The structure of stibnite was investigated by the rotation method. The unit cell contains four molecules of Sb_2S_3 and is of dimensions $a = 11{\cdot}39$, $b = 11{\cdot}48$, $c = 3{\cdot}89$ Å. The space-group is V_h^1. H. H.

Jong (W. F. de) & Hoog (A.). *Carrollit* (*Sychnodymite*). Zeits. Krist., 1927, vol. 66, pp. 168–171, 1 fig.

A mineral from Luushia mine, Katanga, said to be 'sychnodymite', gave an approximate analysis Cu 19·6, Co 37·5, S 39·4, Ni trace = 96·5, corresponding with the formula $CuCo_2S_4$. Examined by the X-ray powder method it showed the spinel structure O_h^7 with $a = 9{\cdot}458$ Å. The mineral is therefore carrollite and not the nickeliferous variety 'sychnodymite'. [This is evidently the same mineral as that previously described as linnaeite from the same locality, M.A. 1–243, 2–342, 3–372. 'Carrollite' has been proved to be identical with linnaeite, M.A. 3–219. See also M.A. 3–339.] L. J. S.

Machatschki (Felix). *Formel und Kristallstruktur des Tetraedrites.* Norsk Geol. Tidsskrift, 1928, vol. 10, pp. 23–32, 1 fig.

X-ray powder photographs of argentiferous fahlerz [presumably tetrahedrite, but no chemical analysis or density given] from Colquechaca, Bolivia, gave a unit cell of edge $a = 10{\cdot}41$ Å. Assuming the simplest formula Cu_3SbS_3, there are eight molecules in the unit-cell. The space-group is T_d^3 and the structure is similar to that of zinc blende. Fahlerz from Felsőbánya gave $a = 10{\cdot}29$ Å., and for tennantite from Cornwall a appears to be rather less than this. L. J. S.

Barth (Tom.) & Lunde (Gulbrand). *Der Unterschied der Gitterkonstanten von Steinsalz und von chemisch reinem Natriumchlorid.* Zeits. physik. Chem., 1927, vol. 126, pp. 417–424.

Halite (rock-salt) from Stassfurt containing about 0·05 % KCl, when compared with silver by the powder method gave the lattice constant $a = 5{\cdot}628$ Å., whilst pure NaCl gave $a = 5{\cdot}626$ Å. Mixed crystals of NaCl saturated with about 5 % KCl at 100° C. gave $a = 5{\cdot}628$ Å. These crystals break down on cooling into KCl and mixed crystals of NaCl poorer in KCl. This difference introduces an error when it is not stated

whether halite or pure NaCl is used for direct comparison in powder photographs. L. J. S.

ZACHARIASEN (William). *Die Kristallstruktur des ammoniumfluorids.* Zeits. physik. Chem., 1927, vol. 127, pp. 218–224, 1 fig.

There are two molecules of NH_4F in a hexagonal unit cell of the following dimensions: $a = 4{\cdot}39$ and $c = 7{\cdot}02$ Å., with $c/a = 1{\cdot}06$. Atoms are located thus: N atoms at $(\frac{1}{3}\ \frac{2}{3}\ \frac{3}{8})$ and $(\frac{2}{3}\ \frac{1}{3}\ \frac{7}{8})$ with H atoms around them, tetrahedrally disposed. F atoms at $(\frac{1}{3}\ \frac{2}{3}\ 0)$ and $(\frac{2}{3}\ \frac{1}{3}\ \frac{1}{2})$. N and F are related as the O and Zn atoms in Bragg's model for zinc oxide. H. E. B.

HENDRICKS (Sterling B.). *The crystal structure of lithium chloride monohydrate.* Zeits. Krist., 1927, vol. 66, pp. 297–302, 2 figs.

The powder, Laue, and spectrum photographs of crystals of $LiCl.H_2O$ are consistent with a simple tetragonal cell having $d_{001} = 3{\cdot}88$ and $d_{100} = 3{\cdot}81$ Å., and containing one molecule. H. H.

HAVIGHURST (R. J.). *Crystal structure of the mercurous halides.* Amer. Journ. Sci., 1925, ser. 5, vol. 10, pp. 15–28, 5 figs.

The X-ray powder method, confirmed by spectrometer measurements on crystals of calomel from Terlingua, Texas, gave:

	a.	*c*.	*c*/*a*.	*D* (calc.)
Hg_2Cl_2	4·47Å.	10·89Å.	2·436	7·16
Hg_2Br_2	4·65	11·10	2·387	7·71
Hg_2I_2	4·92	11·61	2·360	7·68

The unit cell, containing two molecules, is half the size of that of C. Mauguin [M.A. 2–510] and turned through 45°. There are chain molecules XHgHgX along the *c*-axis. The strong double refraction of calomel is explained by the structure. L. J. S.

HAVIGHURST (R. J.). *X-ray reflections from mercuric iodide.* Amer. Journ. Sci., 1925, ser. 5, vol. 10, pp. 556–558.

HgI_2 gave by the powder and spectrometer X-ray methods $a = 4{\cdot}356$, $c = 12{\cdot}340$ Å., $c/a = 2{\cdot}833$, with two molecules in the unit tetragonal cell. L. J. S.

HUGGINS (Maurice L.) & MAGILL (Paul L.). *The crystal structures of mercuric and mercurous iodides.* Journ. Amer. Chem. Soc., 1927, vol. 49, pp. 2357–2367, 3 figs.

These two compounds are tetragonal. Mercuric iodide has a unit cell of dimensions $a = 4{\cdot}34$ and $c = 12{\cdot}34$ Å. The atoms are arranged on

space group D_{4h}^{15}, with co-ordinates for Hg-atoms (0 0 0) and $(\frac{1}{2}\ \frac{1}{2}\ \frac{1}{2})$, and iodines at $(0\ \frac{1}{2}\ u)$, $(\frac{1}{2}\ 0\ \bar{u})$, $(\frac{1}{2}.0.\frac{1}{2}-u)$, and $(0.\frac{1}{2}.u+\frac{1}{2})$; here $u = 0{\cdot}14$. For mercurous iodide, $a = 4{\cdot}92$ and $c = 11{\cdot}64$ Å.; the arrangement is that of D_{4h}^{17}, and there are strings of [Hg–I–I–Hg] groups running parallel to the c-axis. Atomic distances are found as follows: in HgI_2, $d_{(Hg-I)} = 2{\cdot}77$, $d_{(I-I)} = 4{\cdot}10$; in Hg_2I_2, $d_{(Hg-I)} = 2{\cdot}75$ Å. H. E. B.

Thilo (Friedrich). *Röntgenographische Untersuchung und kristallographische Beziehungen der Fluoride, Chloride und Bromide der Erdalkalimetalle.* Inaug.-Diss. Jena, 1927 (Weida i. Thür.), 40 pp., 2 figs.

Thilo (F.). *Röntgenographische Untersuchung und eutropische Beziehungen der Fluoride der Erdalkalireihe.* Zeits. Krist., 1927, vol. 65, pp. 720–721. [Abstract of Dissertation.]

The fluorides, chlorides, and bromides of calcium, strontium, and barium were examined by the X-ray powder method. The fluorides all have the fluorite type of structure and form a eutropic series. The edges of the unit cubes containing four molecules are (corrected) CaF_2 5·45, SrF_2 5·81, BaF_2 6·21 Å. For SrF_2, sp. gr. 4·24, n_{Na} 1·4378. For BaF_2, n_{Na} 1·4747. $SrCl_2$ is of the fluorite type with $a = 7{\cdot}10$–$7{\cdot}12$ Å. [cf. M.A. 3–179]; $CaCl_2$ is probably cubic when anhydrous; and $BaCl_2$ perhaps monoclinic. No definite results were obtained with the bromides. L. J. S.

Wyckoff (Ralph W. G.) & Müller (J. H.). *The crystal structure of cesium fluogermanate.* Amer. Journ. Sci., 1927, ser. 5, vol. 13, pp. 347–352, 1 fig.

Caesium fluogermanate was obtained as a crystalline powder by mixing hot solutions of caesium fluoride and germanium fluoride. The unit cube of edge $a = 8{\cdot}99$ Å. contains four molecules Cs_2GeF_6, and the atoms are arranged on the K_2PtCl_6 pattern. The calculated density is 4·10. L. J. S.

Hentschel (H.) & Rinne (Fr.). *Über die Kristallstruktur des Kobalti-Hexammin-Jodid* $[Co(NH_3)_6]I_3$. Ber. math.-physisch. Kl. Sächs. Akad. Wiss. Leipzig, 1927, vol. 79, pp. 1–52, 1 pl., 14 text-figs.

Crystals of cobalti-hexammine iodide were examined by the Laue and rotating crystal methods. The unit cube of edge 10·91 Å. contains four molecules $[Co(NH_3)_6]I_3$. The compound, of the AB_3 type, is on a face-centred cubic lattice which may be regarded as a combination of the

fluorite and halite types of structure. The positions of the atoms are determined. L. J. S.

Bozorth (Richard M.) & Haworth (F. E.). *The crystal structure of magnesium platinocyanide heptahydrate.* Physical Rev., 1927, ser. 2, vol. 29, pp. 223–230, 1 fig.

Crystals of this substance are tetragonal, with $a = 6{\cdot}26$ and $c = 14{\cdot}6$ Å. The arrangement of atoms is of the body-centred type, with space-group D_4^{17}. Strings of Mg and Pt atoms run down through the structure parallel to the *c*-axis. A curious feature of the structure is that, while $d_{(Mg-Pt)}$ is 1·57 Å. along the length of the *c*-axis, the distance between a Mg atom and an adjacent Pt atom in the horizontal direction is 10·3 Å., or nearly seven times as great. This, it is thought, has some bearing upon the strong pleochroism exhibited by this substance. H. E. B.

Hylleraas (Egil A.). *Bestimmung der Lage der Sauerstoffatome in Rutil und Anatas mit Hilfe der optischen Doppelbrechung.* Zeits. Krist., 1927, vol. 65, pp. 469–492, 2 figs.

The dynamical theory of molecular vibrations in crystals due to M. Born is applied to rutile and anatase. The double refraction is calculated for different values of the lattice-parameter, and by comparison with the observed optical properties a value of the parameter is obtained, which agrees sufficiently well with that obtained by X-ray investigation. H. H.

Tokody (László). *A rutil szerkezète.* [The structure of rutile.] Math. Természettud. Értesitő, Budapest, 1927, vol. 44, pp. 247–253 (Hung.), p. 254 (Germ. summary), 1 fig.

Rutile examined by the Debye-Scherrer X-ray method gave for the dimensions of the tetragonal cell $a = 4{\cdot}4923$, $c = 2{\cdot}8930$ Å., containing two molecules. The calculated density is 4·511. The shortest distance between Ti and O atoms is 2·11 Å. The results are in agreement with those of L. Vegard [M.A. **2**–506, **3**–345] and G. Greenwood [M.A. **2**–508], but simpler co-ordinates are given for the oxygen atoms. K. Z.

Dehlinger (U.). *Über die Kristallstruktur der Antimonoxyde.* Zeits. Krist., 1927, vol. 66, pp. 108–119, 2 figs.

Antimony oxide exists in the four modifications Sb_2O_3, Sb_2O_4, Sb_6O_{13}, Sb_2O_5. For Sb_2O_3 the unit cell has an edge $a = 11{\cdot}14$ Å., and contains eight molecules of Sb_4O_6 the space-group being O_h^7. A very similar

structure with $a = 10{\cdot}22$ Å. is assigned to Sb_2O_4. The next modification Sb_6O_{13} has a tetragonal or pseudo-tetragonal symmetry, while Sb_2O_5 has cubic structure with the same lattice constant as the tetroxide.

H. H.

Forster (R.). *Struktur von kolloidalem SnO_2.* Physik. Zeits., 1927, vol. 28, pp. 151–152.

The 'a' and 'b' colloidal modifications of tin dioxide when examined by the powder method appear to be identical with each other and with the crystalline modification, cassiterite, except that the space-lattices are slightly bigger. The variation of the lattice dimensions of prepared colloidal SnO_2 is not always constant, and is greatest in the case of a gel prepared by the dialysis of $SnCl_2$ solutions. In this case $a = 4{\cdot}91$ and $c = 3{\cdot}47$ Å. (compare cassiterite, $a = 4{\cdot}67$ and $c = 3{\cdot}14$ Å.). Other gels give lattice dimensions intermediate in value between the above two sets.

H. E. B.

Gottfried (C.) & Mark (H.). *Die Bestimmung der Struktur von $Zn(OH)_2$.* Zeits. Krist., 1927, vol. 65, pp. 416–424, 2 figs.

The structure of orthorhombic crystals of zinc hydroxide was investigated by the rotation method. The unit cell contains eight molecules of $Zn(OH)_2$, and is of dimensions $a = 6{\cdot}73$, $b = 7{\cdot}33$, $c = 8{\cdot}47$ Å. The space-group is probably V_h^{16}.

H. H.

Böhm (J.). *Über Aluminium- und Eisenhydroxyde. I.* Zeits. Anorg. Chem., 1925, vol. 149, pp. 203–216, 1 pl., 1 text-fig.

X-ray powder photographs of precipitated aluminium and ferric hydroxides were compared with those given by the well-crystallized minerals, diaspore AlOOH, gibbsite $Al(OH)_3$, and goethite FeOOH. Bauxite from Les Baux containing only 14·5 % H_2O gave a pattern like that of 'Rubinglimmer' (pyrrhosiderite, FeOOH), and it is concluded that bauxite is AlOOH. Aluminium hydroxide precipitated in the cold is amorphous, but from a boiling solution bauxite is formed. Gibbsite is precipitated from an alkali aluminate. Precipitated ferric hydroxide is amorphous; after slow drying it gives haematite, but when heated with KOH it yields goethite.

L. J. S.

Jong (W. F. de). *Röntgenographische Untersuchungen an lateritischen Gesteinen und an Sporogelit.* Zeits. Krist., 1927, vol. 66, pp. 303–308, 1 fig.

The weathering of igneous rocks results either in the formation of

kaolin or of aluminium and iron hydroxides. The crystalline aluminium hydroxides consist of gibbsite ($Al_2O_3.3H_2O$), bauxite ($Al_2O_3.H_2O$), and diaspore ($Al_2O_3.H_2O$). The X-ray powder photographs of these are compared. The existence of amorphous aluminium hydroxide as an important rock constituent is doubtful. H. H.

Heide (Fritz). *Über den Vaterit.* Centralblatt Min., 1924, pp. 641–651.

Heide (F.). *Nachtrag zu der Mitteilung über die „Vaterit" genannte Modifikation des $CaCO_3$.* Centralblatt Min., Abt. A, 1925, p. 198.

The gelatinous precipitate from solutions of K_2CO_3 ($\frac{1}{2}N$) and $CaCl_2$ ($2N$) at 5° C. changes after $1\frac{1}{2}$–2 hours to minute (3–10 μ) radially-fibrous spherulites of vaterite. Heated at 100° in water this is transformed into calcite, but the dry material is stable up to 430–440°. X-ray powder photographs show a structure different from that of both calcite and aragonite. The hexagonal cell of vaterite, $a = 4{\cdot}120$, $c = 8{\cdot}556$ Å., $c/a = 2{\cdot}077$, contains two molecules $CaCO_3$ and the calculated density is 2·645. After heating at 430–440° the material shows the lines of calcite. L. J. S.

Cork (J. M.). *The crystal structure of some of the alums.* Phil. Mag., 1927, ser. 7, vol. 4, pp. 688–698, 1 pl., 2 text-figs.

The alums crystallize in the T_h^6 group of the cubic system. The arrangement is similar to that proposed by Wyckoff [M.A. 2–205] and parameters have been evaluated. The unit cells, containing four molecules of $AB(SO_4)_2{\cdot}12H_2O$, have edges of the following dimensions:

	NH_4Al.	KAl.	KCr.	RbAl.	CsAl.	TlAl.
a	12·18	12·14	12·14	12·20	12·31	12·21Å.

H. E. B.

Vegard (L.). *The structure of xenotime and the relation between chemical constitution and crystal structure.* Phil. Mag., 1927, ser. 7, vol. 4, pp. 511–525, 1 pl., 2 figs.

Powder photographs of xenotime show that the structure and arrangement of the atoms are the same as in zircon [M.A. 3–345]; $a = 9{\cdot}735$, $c = 6{\cdot}013$ Å, $c/a = 0{\cdot}6177$. In both, the number of the atoms and the sum of their valencies are the same. The atomic volumes are also nearly the same, but for the close packing the atoms of xenotime would have to suffer a certain accommodation. The mineral has therefore probably been formed under high pressure; at normal pressure the structure is unstable and the mineral readily changes to the metamict state. L. J. S.

Hendricks (Sterling B.) & Wyckoff (Ralph W. G.). *The space group of aluminium metaphosphate.* Amer. Journ. Sci., 1927, ser. 5, vol. 13, pp. 491–496, 1 fig.

Minute cubes (sp. gr. 2·71) of prepared $Al(PO_3)_3$ gave a body-centred unit of edge $a = 13{\cdot}63$ Å. and containing sixteen molecules. The space-group appears to be Te-6. L. J. S.

Wyckoff (Ralph W. G.), Hendricks (Sterling B.), & McCutcheon (Thomas P.) *On the crystal structure of hexamine cobalti-perchlorate,* $[Co.6NH_3](ClO_4)_3$. Amer. Journ. Sci., 1927, ser. 5, vol. 13, pp. 388–398.

The unit cube $a = 11{\cdot}39$ A. contains four molecules. Although very similar to the corresponding iodide [M.A. 3-340] the structure is not holohedral, but probably tetartohedral T–4. L. J. S.

Zachariasen (William). *Notiz über die Kristallstruktur von Phenakit, Willemit und verwandten Verbindungen.* Norsk Geol. Tidsskrift, 1926, vol. 9, pp. 65–73.

Phenakite (Be_2SiO_4) from Kragerö, Norway, and willemite from Franklin Furnace, New Jersey, were examined by X-ray methods, and also the isomorphous salts Li_2BeF_4, Li_2MoO_4, and Li_2WO_4. They are all trigonal-rhombohedral with space-group C_{3i}^2. The elementary cell containing six molecules has dimensions: for phenakite, $a = 7{\cdot}19$, $c = 8{\cdot}23$ Å., $c/a = 1{\cdot}145$; willemite, $a = 8{\cdot}04$, $c = 9{\cdot}34$ Å., $c/a = 1{\cdot}161$; Li_2BeF_4, $a = 7{\cdot}60$, $c = 8{\cdot}85$ Å., $c/a = 1{\cdot}165$; Li_2MoO_4 and Li_2WO_4, a about 8·20, c about 9·45 Å. L. J. S.

Brown (G. B.) & West (J.). *The structure of monticellite* ($MgCaSiO_4$). Zeits. Krist., 1927, vol. 66, pp. 154–161, 3 figs.

From rotation photographs the authors find that the structure of monticellite is identical with that of olivine when half the Mg atoms of the olivine are replaced by Ca atoms. There are four molecules in each unit cell of dimensions $a = 4{\cdot}815$, $b = 11{\cdot}08$, $c = 6{\cdot}37$ Å., and the space-group is V_h^{16}. The material [? natural or artificial] used for the investigation gave on analysis: SiO_2 36·8, FeO 4·75, MnO 1·62, MgO 21·6, CaO 34·31, H_2O 0·95. H. H.

Wyckoff (Ralph W. G.) & Hendricks (Sterling B.). *Die Kristallstruktur von Zirkon und die Kriterien für spezielle Lagen in tetragonalen Raumgruppen.* Zeits. Krist., 1927, vol. 66, pp. 73–102, 3 figs.

The unit cell of zircon has dimensions given by $a = 6{\cdot}60$, $c = 5{\cdot}88$ Å.,

and contains four molecules. The space-group is D_h^{19}. Approximate positions of all the atoms can be determined. [Cf. Min. Mag., **21**–187.] Tables are added for discriminating between all possible special positions of the atoms of a tetragonal crystal, when the Röntgen spectrum is given. H. H.

Stockwell (C. H.). *An X-ray study of the garnet group.* Amer. Min., 1927, vol. 12, pp. 327–344, 4 figs.

Determinations of the refractive index, specific gravity, and edge of the unit cube (by the X-ray powder method) were made for forty garnets, mainly from American localities. These data can be used for determining the nature of the garnet, with in some few cases a supplementary chemical test for manganese to distinguish spessartine from almandine, and the molecular percentage composition can be calculated. In only two cases, however, were the determinations made on analysed material, and the correlation with the chemical composition is based on the previous work of W. E. Ford [M.A. **2**–37]. Plotting the refractive index against the sp. gr., Ford found that the garnets fall into two series (almandine-pyrope-spessartine and grossular-andradite), and this is emphasized by plots of the cell dimensions [cf. M.A. **3**–251] against either the refractive index or the sp. gr. Calculated values for the pure molecules are :

	n.	Sp. gr.	*a*.
Pyrope	1·705	3·510	11·430 Å.
Almandine	1·830	4·250	11·493
Spessartine	1·800	4·180	11·568
Grossular	1·735	3·530	11·840
Andradite	1·895	3·750	12·040

L. J. S.

Gottfried (C.). *Die Raumgruppe des Helvins.* Zeits. Krist., 1927, vol. 65, pp. 425–427.

The rotation method gave for the structure of helvine the space-group T_d^4 with a unit cell having an edge of length 8·52 Å. and containing two molecules of $(SiO_4)_3Be_3(Mn,Fe)_3.MnS$. H. H.

Goßner (B.) & Mußgnug (F.). *Die chemische Zusammensetzung von Zunyit.* Centralblatt Min., Abt. A, 1926, pp. 149–155.

Goßner (B.). *Röntgenographische Untersuchungen am Zunyit.* Neues Jahrb. Min., Abt. A, 1926, Beil.-Bd. 55, pp. 319–332, 1 pl.

(1) Analysis of clear tetrahedra of zunyite from Zuñy mine, Colorado, gave SiO_2 24·15, Al_2O_3 57·68, Fe_2O_3 0·18, Na_2O 0·31, K_2O 0·18, F 5·19,

Cl 2·90, P_2O_5 0·52, H_2O 11·12, total (less O for F and Cl) 99·50. Considering a part of the SiO_2 replaceable by AlO_2H or AlOF (as suggested by the isomorphism of TiO_2 and MgF_2), the formula is given as $SiO_2.AlF(OH)_2.2AlO_2H$ or $2SiO_2.2AlOF.3AlO_2H.Al(OH)_3$. The crystals are mostly isotropic with n_{Na} 1·595.

(2) Zunyite (sp. gr. 2·878) examined by X-ray methods (rotating crystal, powder, and Laue) gave for the edge of the elementary cube 13·92 Å. (mean of determinations ranging from 13·80 to 14·00). The space-group is T_d^1. The chemical formula is adjusted so that six molecules of $3SiO_2.3AlO(F,Cl).4AlO_2H.2Al(OH)_3$ are contained in the unit cube.

L. J. S.

Goßner (B.) & Mußgnug (F.). *Über den Leifit.* Centralblatt Min., Abt. A, 1927, pp. 221–228, 3 figs.

Rotating crystal photographs of small crystals of leifite [M.A. 1–123] gave an hexagonal cell $a = 14·34$, $c = 4·93$ Å., and axial ratio (hitherto not determined for this mineral) $a : c = 1 : 0·344$. There is a perfect cleavage $(10\bar{1}0)$. The layer-lines in the photograph are, however, not quite symmetrical about the horizontal line and Lauegrams also show a lack of symmetry. The crystals also show optical anomalies, and they are perhaps pseudo-hexagonal. Calculation from O. B. Bøggild's formula $Na_2Al_2Si_9O_{22}.2NaF$ (mol. wt. 788·5) and sp. gr. 2·575 give 1·78 molecules in the unit cell. By considering a part of AlOF replaceable by SiO_2 and Na_2O by H_2O a formula $Na_2Si_4O_9.AlOF$ (mol. wt. 359·5) gives 3·83 molecules in the unit cell. This is considered a near enough approximation to 4 to justify the new formula.

L. J. S.

Goßner (B.) & Mußgnug (F.). *Röntgenographische Untersuchung von Benitoit.* Centralblatt Min., Abt. A, 1927, pp. 304–310, 1 fig.

A crystal of the ditrigonal-bipyramidal benitoite was examined by the rotation method. $a = 6·62$, $c = 4·86$ Å., $c/a = 0·735$. The rhomb-based cell contains one molecule $BaTiSi_3O_9$ and the space-group is D_{3h}^1. The positions of the atoms are determined and compared with those in quartz.

L. J. S.

Gottfried (C.). *Die Raumgruppe des Staurolithe.* Zeits. Krist., 1927, vol. 66, pp. 103–107.

The rotation method gave for staurolite a unit cell of dimensions $a = 7·84$, $b = 16·52$, $c = 5·61$ Å., containing two molecules of $(SiO_5)_4Al_9Fe_2H$. The space-group is probably V_h^{11}, though V_h^1 and V_h^2 are possible.

H. H.

Mark (H.) & Mehner (H.). *Das Gitter des Tetraphenylsilikans* $Si(C_6H_5)_4$. Zeits. Krist., 1927, vol. 65, pp. 455–460, 3 figs.

The rotation method gave for tetraphenylsilicane a unit cell containing two molecules of $Si(C_6H_5)_4$ with edges of length $a = 11{\cdot}50$, $c = 6{\cdot}97$ Å. The space-group is probably V_d^1 or perhaps D_{4h}^9. H. H.

Bragg (*Sir* W. H.). *A note on the cristalline [sic] structure of certain aromatic compounds.* Zeits. Krist., 1927, vol. 66, pp. 22–32, 6 figs.

A discussion of the structure of anthracene, naphthalene, naphthalene tetrachloride, and α-chlornaphthalene tetrachloride. [Min. Mag. **19**–316.] H. H.

Morgan (Gilbert T.) & Astbury (W. T.). *Crystal structure and chemical constitution of basic beryllium acetate and its homologues.* Proc. Roy. Soc. London, Ser. A, 1926, vol. 112, pp. 441–448, 1 pl., 3 text-figs.

The crystal-structure of the basic acetate was described in a previous paper [M.A. **2**–201]. Further homologues have with some little difficulty been prepared and their structures attempted. The addition of a CH_2 group to the carbon chain, giving the basic propionate, lowers the symmetry from cubic to monoclinic. The basic isobutyrate is anorthic and no structure suggests itself. The pivalate is monoclinic, the arrangement of atoms being fairly near to that of those in the cubic acetate.

H. E. B.

Zachariasen (William). *The crystal structure of tetramethylammonium iodide.* Norsk Geol. Tidskrift, 1928, vol. 10, pp. 14–22, 1 fig.

Crystals of tetramethyl-ammonium iodide examined by the X-ray rotation and powder methods gave a unit cell of dimensions $a = 7{\cdot}941$, $c = 5{\cdot}749$ Å. ($c/a = 0{\cdot}724$) containing two molecules $N(CH_3)_4I$. The crystal-class is ditetragonal-bipyramidal and the space-group D_{4h}^7. Etch-figures show holohedral symmetry. The position of the atoms is discussed. These results are in closer agreement with those of L. Vegard (1917 and 1926) than with those of G. Greenwood (Min. Mag., 1927, **21**–261). L. J. S.

Mark (H.) & Mehner (H.). *Das Gitter des Diäthylphtalylketon.* Zeits. Krist., 1927, vol. 65, pp. 461–468, 3 figs.

The rotation method gave for diethylphthalylketone a unit cell containing four molecules of $C_6H_5(COOC_2H_5)_2$ with edges of length $a = 7{\cdot}25$, $c = 20{\cdot}47$ Å. The space-group is D_{4h}^{19}. H. H.

Mark (H.) & Noethling (W.). *Die Struktur einiger Methanderivate.* Zeits. Krist., 1927, vol. 65, pp. 435–454, 5 figs.

The cubic modification of tetranitromethane has a unit cell with edge 9·2 Å. containing four molecules of $(NO_2)_3$–C–O–NO. The unit cube of tetramethylmethane has an edge of length 12·48 Å. and contains eight molecules $C(CH_3)_4$. The space-group is probably O_h^7. The rhombohedral space-group of triphenylcarbinol and triphenylbrommethane is D_{3d}^5 and their unit cell contains three molecules of $(C_6H_5)_3C.OH$ or $(C_6H_5)_3C.Br$. This unit cell has edges $a = 17·9$, $c = 12·5$ Å. and $a = 14·05$, $c = 22·0$ Å. respectively. H. H.

Hendricks (Sterling B.). *The molecular symmetry of penta-erythritol.* Zeits. Krist., 1927, vol. 66, pp. 131–135, 3 figs.

I. Nitta (1927) had pointed out that the structure of penta-erythritol, $C(CH_2OH)_4$, as given by Mark and Weissenberg, and verified by Huggins and Hendricks, was inconsistent with the Laue photographs. Study of a new Laue diagram gives either S_4^2 or C_4^5 as the correct space-group, in agreement with Nitta's work. H. H.

Mark (H.) & Weissenberg (K.). *Zur Struktur des Pentaerythrits.* Zeits. Krist., 1927, vol. 65, pp. 499–500.

A reply to some criticisms made by H. G. K. Westenbrink and F. A. van Melle [M.A. 3-347] on previous work by the authors on the structure of penta-erythritol. H. H.

Precious Stones.

Kunz (George F.). *Precious stones.* Mineral Industry, New York & London, 1926, vol. 34 (for 1925), pp. 590–616, 1 fig. [The wrapper of author's reprints bears the title: *The production of precious stones for the year 1925.*]

—— Ditto for 1926. Ibid., 1927, vol. 35 (for 1926), pp. 563–591.

Continuations of previous annual reports [Abstr., vol. 2, p. 230]. The report for 1925 gives a sketch-map of the diamond-producing districts in the southern portion of Africa. Transparent, pleochroic (dark blue to pale green) lazulite is mentioned from Santa Rita, Minas Geraes, Brazil. Blue zircon is stated to be found, in pieces up to 525 carats, in alluvial deposits in the old sapphire workings north of Bangkok, Siam. It is brown when found, and the blue colour is said to be obtained by heating the stones with cobalt nitrate and potassium ferrocyanide. In the 1926 report the name 'starlite' is suggested for this blue zircon. L. J. S.

Whitlock (Herbert P.). *The art of the lapidary.* Guide Leaflet no. 65, American Museum of Natural History, New York, 1926, 29 pp., 1 pl., 28 text-figs.

A popular account of the method of cutting gem-stones and of the forms of cutting. L. J. S.

Johnsen (A.). *Form und Brillanz der Brillanten.* Sitzungsber. Preuss. Akad. Wiss. Berlin, 1926, pp. 322–330, 2 figs.; [Abstract:] Fortschr. Min. Krist. Petr., 1927, vol. 11, pp. 309–312, 2 figs.; Centralblatt Min., Abt. A, 1926, pp. 358–361, 2 figs.

The angles of the main side facets and the depth of the stone that will give the maximum amount of reflection from the back facets and consequently the greatest brilliancy is calculated for the triple-cut brilliant taking n_D 2·4175 of diamond. The ratio of the depth of the crown to that of the under portion works out at 1 : 2·09. L. J. S.

Rösch (Siegfried). *Beitrag zum Brillanzproblem.* Zeits. Krist., 1927, vol. 65, pp. 46–68, 14 figs.

An historical sketch is given of theoretical investigations on the play of colours in diamonds and the best method of cutting the stones. The work of A. Johnsen [preceding Abstract] and an earlier paper by the author and W. Krumbhaar is then extended and applied to other precious stones, such as zircon, sapphire, and topaz. The theory is illustrated by pictures taken by the author's method for photographing the reflections from crystal faces. H. H.

Eppler (W. Fr.) & Rose (H.). *Einige Beobachtungen am Diamant.* Centralblatt Min., Abt. A, 1925, pp. 251–253.

As shown by the time occupied in grinding, diamond is much harder on an octahedron face than on a cube face. A 'four-point' brilliant with the table facet parallel to a cube face is much more readily cut than a 'three-point' stone in which the table facet can be only approximately parallel to an octahedron face. A diamond with a cavity ('negative crystal') shows in polarized light a lamellar structure parallel to the planes of the rhombic-dodecahedron. L. J. S.

Bracewell (Smith). *Report on the preliminary geological survey of the Potaro-Ireng district of British Guiana.* Georgetown, Demerara, 1927, Combined Court no. 21, 60 pp., 1 pl., 18 text-figs.

The conditions on the Potaro and Ireng rivers are very similar to those on the Mazaruni river [following Abstract]. The diamonds are also very

similar but scarcer and, as a rule, smaller. The largest diamond ($56\frac{3}{4}$ carats) yet found in British Guiana came from the Uewang river, and one of $24\frac{1}{4}$ carats was found in Maple creek in 1925. The alluvial deposits also carry gold and very sparingly palladium in combination with mercury. L. J. S.

Conolly (H. J. C.). *Report of the preliminary survey of the Mazaruni and Puruni diamond fields, British Guiana. March–December, 1925. Part I.* Economic Geological Survey, Dept. Sci. & Agriculture. London (Crown Agents for the Colonies), [1926], v + 103 pp. fol., 9 pls. (8 maps), 11 text-figs.

—— *The Mazaruni and Puruni diamond fields, British Guiana.* Mining Mag. London, 1927, vol. 36, pp. 137–149, 5 figs.

The diamonds are found in alluvial deposits, in the valley-bottoms or on the hills, overlying Archaean gneiss with volcanic and sedimentary series and intrusive igneous rocks. The alluvial deposits are situated below the escarpment of the Pakaraima Mts. consisting of conglomerates and sandstones lying unconformably on the Archaean and intruded by gabbro and dolerite. It is believed that the diamonds were derived from this sedimentary series (though none have been actually found in it). The original home cannot be conjectured. Associated minerals in the alluvial deposits are jasper, tourmaline, ilmenite, rutile, anatase, corundum, gold, &c., rarely zircon, topaz, tantalite, &c. None of them are sure indicators of diamond. The diamonds average six to the carat and are either much water-worn or quite sharp. The form is octahedral or dodecahedral, and the colour variable (colourless, green, yellow, brown, rarely blue). A grey to black variety is compared with the South African 'framesite'. L. J. S.

Mitchiner (J. H.). *The alluvial diamonds of British Guiana.* Mining Mag. London, 1927, vol. 36, pp. 73–83, 5 figs.

A general account of the diamond-mining industry and of the local conditions. L. J. S.

Humphrey (W. A.). *Note on an occurrence of diamonds near Port Nolloth.* Trans. Roy. Soc. South Africa, 1927, vol. 14, pp. 217–218.

Diamonds were recently discovered between Port Nolloth and the mouth of the Kammas river in Namaqualand, in beds of gravel occupying an old river course, perhaps a former channel of the Kammas river. The associated minerals in the gravel are agate, jasper, opal, chalcedony,

garnets, serpentine, fresh olivine crystals, and grains of a black carbonaceous mineral resembling coke. The diamonds are well crystallized, of octahedral or dodecahedral habit, and show slight traces of wear at the corners, indicating transport from a distance. The olivine crystals are so fresh that it is unlikely that they are original associates of the diamonds.

S. J. S.

Ježek (Bohuslav). *K nálezu diamantů v Čechách.* [On the finding of diamonds in Bohemia.] Hornický věstník [Mining Journ.], 1927, vol. 28, pp. 433–437 and 461–466, 5 figs.

In 1869 a single diamond was found in the pyrope-bearing gravels of Dlažkovice, and it is now in the National Museum at Prague. Its authenticity has been doubted, but the author gave in 1912 reasons for considering it to be really of Bohemian origin. In September 1927 a second diamond was brought to the gem-working Art School at Turnov, which had been found in the residue after sorting pyropes. This is a colourless to greyish octahedron with small rhombic-dodecahedron faces and a surface texture similar to that of Fersman and Goldschmidt's 'growth-solution form' ('Wachstums-Lösungskörper'). It weighs 22·06 milligrams, and measures $3 \times 2{\cdot}85 \times 2{\cdot}6$ mm.; sp. gr. 3·487. From the information gathered on the spot there appears no reason to doubt the authenticity of this second Bohemian diamond. F. S.

[Kryzhanovsky (V. I.)] Крыжановский (В. И.). Пегматитовые жилы в окрестностях Урги в Монголии. Kryžanovskij (V.) = Kryjanowsky (V.). *Sur les pegmatites des environs d'Urga en Mongolie.* Докл. Росс. Акад. Наук (Compt. Rend. Acad. Sci. Russie), 1925, pp. 13–16.

The author visited the gem mines in granite-pegmatite veins about 40 km. west of Urga on the Gorikho river in Mongolia. Here in microlitic cavities are found large crystals of quartz, orthoclase, and albite, with fine topaz, beryl, fluorite, martite, and malacon. The micas biotite and muscovite are very rare, and lepidolite is absent. Quartz is water-clear, yellowish, smoky, or black. Some hundred topaz crystals of all types were collected. Fine beryls were purchased, but were not actually seen in situ.

P. N. C.

Spencer (L. J.). *A crystal of aquamarine.* Nat. Hist. Mag. (Brit. Mus.), 1927, vol. 1, pp. 107–111, 3 figs.

A very fine and well-developed crystal of beryl of a rich bluish-green colour and of gem quality, weighing 2505 grams, has recently been

acquired for the British Museum collection. The forms are *m a c p s u* [Dana's letters]. Distinct etch-figures and other signs of corrosion are shown on the faces. The locality is provisionally given as 'Bingara', Minas Geraes, Brazil [since ascertained to be Pingueira Mtn., Santa Rita de Arassuahy, Minas Novas district, Minas Geraes]. L. J. S.

Kurbatov (J.) & Kargin (W.). *Über die Verwandlung der grünen Färbung des Berylls in eine bläuliche.* Centralblatt Min., Abt. A, 1927, pp. 361–362.

Green beryl from Sherlova Mtn., Transbaikalia, heated in a muffle commences to change colour to blue at about 400° C. The change is complete in an hour at 425° or in half an hour at 450°. Chemical tests made on a large quantity of the beryl showed the presence of iron, but no nickel, chromium, &c. The cause of the change in colour is perhaps physical. L. J. S.

Davidson (S. C.). *The hiddenite occurrence in North Carolina.* Amer. Min., 1927, vol. 12, pp. 305–307.

The deposit near Stony Point in Alexander Co. has recently been again opened and a number of crystals of hiddenite of gem quality have been found. These occur in drusy cavities in small veins and lenses of pegmatite penetrating contorted and fine-grained quartz-biotite-garnet-gneiss. Two periods of mineralization showing different types of hiddenite are distinguished. Hypidiomorphic crystals of hiddenite are also embedded in the pegmatite. Pseudomorphs of mica after hiddenite are mentioned. L. J. S.

Kellner (G. J.). *Beiträge zum Smaragdbergbau in der Republik Kolumbien, Südamerika.* Zeits. Prakt. Geol., 1927, vol. 35, pp. 70–74, 5 figs.

A brief general account of the occurrences of emerald in Colombia [cf. M.A. 3–283]. L. J. S.

Michel (H.). *Der brasilianische Smaragd.* Centralblatt Min., Abt. A, 1927, pp. 218–220.

Brazilian emerald from Bom Jesus das Meiras in Bahia [M.A. 1–332–3] and from the Rio Doce in Minas Geraes is beryl (sp. gr. 2·70–2·72), and is not to be confused with the green tourmaline from Brazil also known as 'Brazilian emerald'. It has recently appeared on the market in some quantity, but owing to its freedom from fissures and inclusions it has been regarded with some suspicion. The colour also has a yellowish cast, and

the behaviour of the stone to various colour tests is not quite the same as the Colombian emerald.

R. Brauns in an appended note (p. 220) describes a crystal (54 × 15 mm.) from Bom Jesus with the forms *m c π p u s* [Dana's letters] and *o'* (11$\bar{2}$4). Attached to this crystal are minute crystals of topaz, tourmaline, and magnesite. L. J. S.

Reagan (Albert B.). *Garnets in the Navajo country.* Amer. Min., 1927, vol. 12, pp. 414–415.

The pyropes of gem quality are collected by the Indians in north-east Arizona. They occur with basic intrusive rocks and especially in volcanic agglomerate in which are many blocks of a garnetiferous diorite-gneiss.

L. J. S.

Hibsch (J. E.). *Das Granatenbergel bei Meronitz und die »böhmischen Granaten«.* Bilin (Museumsgesellschaft), 1926, 20 pp.

A general and historical account is given of the occurrence and winning of pyrope near Meronitz in the Midland Mts. of Bohemia. It is found in the debris of a basalt breccia and has been derived from a peridotite.

L. J. S.

Michel (H.). *Neuerungen in der Herstellung künstlicher Edelsteine.* Centralblatt Min., Abt. A, pp. 69–76, 3 figs.

Notes, supplementary to the author's recent book on artificial gem-stones [M.A. 3–157], taken from technical journals and German patents, in addition to some original observations. Fracture and abrasive tests show that artificial corundum is more suitable and reliable than natural stones for pivot supports; further the growth of the drops can be regulated to more suitable shapes and sizes (up to 300 carats). By rotating the drops during growth the curved lines of growth can be largely eliminated; also it is possible to control the direction of the optic axis and to develop crystal-faces on the exterior of the drops. Artificial corundum and spinel of various new colours were tested by the author's colour and luminescent methods [M.A. 3–190]. Figures are given of minute ($\frac{1}{2}$ mm.) crystals of artificial emerald. L. J. S.

Brauns (R.). *Die Brechungsexponenten des synthetischen hellblauen Spinells.* Centralblatt Min., Abt. A, 1927, pp. 265–267.

A new artificial gem-stone of more attractive colour, pale to dark sky-blue, than the earlier cobalt-blue stones, gave the following data (all determined on the same piece). Sp. gr. 3·62, H. 8, n (red) 1·7231, n (Na) 1·7269, n (green) 1·7356; analysis gave Al_2O_3 88·70, MgO 11·58%

near the formula $MgO.3Al_2O_3$. The material shows a crystalline structure and strained polarization effects. The refractive index is higher than that of magnesia-spinel; and it is supposed that the large excess of Al_2O_3 is held in solid solution in $MgO.Al_2O_3$. Another 'pear' shows prominent cube (100) faces with smaller (111). L. J. S.

Topographical Mineralogy.

Flink (Gustav). *Långban and its minerals.* Amer. Min., 1926, vol. 11, pp. 195–199. [Cf. M.A. 2–261, 3–122.]

A brief account is given of this mineral locality and a list of 81 mineral-species recorded from there, of which 21 have not been found elsewhere. In addition, there are 423 unknown minerals awaiting examination. L. J. S.

Fromme (J.). *Die Minerale des Brockengebirges insonderheit des Radautales.* Braunschweig (E. Appelhans & Co.) 1927, v + 220 pp., 6 pls., 6 maps. Price 7·50 Mk.

The first portion of the book (pp. 1–20) contains (1) a brief account of the formation of the Harzgebirge, (2) a more detailed one of that of the massif of the Brocken, and (3) a general account of the eruptive rocks of the area and of the minerals formed during the various phases of their consolidation. In the main portion the minerals found in the district and their modes of occurrence at each locality are described in detail. The species, 105 in number, are arranged according to Tschermak's classification. There is a brief index of species, but none of localities; neither is there a separate bibliography, but copious references to the literature on the minerals of the district are given in the text. The author has for many years specialized in the minerals of the district, particularly those found in the gabbros and associated rocks of the Radautal, and much of the material described is in his collection. F. N. A.

Slavík (F.). *The minerals of Příbram.* Amer. Min., 1927, vol. 12, pp. 345–350.

The ancient mines of Příbram and of the adjoining town of Březové Hory are in a syncline of Cambrian sediments with underlying Algonkian schists and penetrated by diabase dikes. The materials of the veins were probably deposited from solutions of decreasing temperature from the granite massif of central Bohemia. The paragenesis of the veins is complex, 28 generations of minerals being distinguished. A list of 75 minerals found in the veins is added. L. J. S.

Ježek (Bohuslav). *Jáchymovské minerály.* [The minerals of Jáchymov = Joachimsthal, Bohemia.] Hornický věstník [Mining Journ.], 1927, vol. 28, pp. 525–527.

A list of 100 mineral-species that have been found at this well-known locality, where ores of silver, cobalt, nickel, and uranium have been worked. Notes are given as to how the rarer species are represented in the collections at Prague, Vienna, &c. F. S.

A. (J.) [i.e. Auer (Jan)]. *Nástin geologických poměrů a hornictví v Jáchymově.* [Sketch of the geological features and of the mining at Jáchymov.] Hornický věstník, 1927, vol. 28, pp. 532–536, 541–555, 14 figs.

A summary description of the Jáchymov mining district. The following new analyses by O. Koblic are given of the red dolomite associated with the uraninite: I, rose-red at some distance from the ore; II, flesh-red nearer the ore; and III, the brownish brick-coloured altered gangue in contact with the uraninite.

	CaO.	MgO.	FeO.	MnO.	CO_2.	U_3O_8.	Insol.*	H_2O.	SO_3.	Total.
I.	28·1	18·7	4·2	1·2	45·5	—	1·9	0.6	—	100·2
II.	27·0	17·8	4·3	1·6	44·1	—	4·9	0·4	—	100·1
III.	24·3	13·3	14·0	1·2	35·5	7·4	3·6	1·1	trace	100·4

*Approximately SiO_2 35, Fe_2O_3 65%.

F. S.

Tschirwinsky (P.) [= Chirvinsky (P. N.)]. *Beiträge zur Mineralogie Rußlands. II. Teil. Fluorit, Calcit, Aragonit, Zinkspat, Cerussit, Baryt.* Zeits. Krist., 1927, vol. 65, pp. 361–379. [Cf. M.A. 3–125.]

Notes on the occurrence of these minerals at various Russian localities, with several chemical analyses. L. J. S.

[Chirvinsky (P.N.)] Чирвинский (П. Н.). Полезные ископаемые Кубани и Черноморья.—Tschirwinsky (Peter). *Nutzbare Fossile natürlicher Rohstoffe des Kubangebietes und des Bezirkes des Schwarzen Meeres.* Труды Северо-Кавказской Ассоциации Научно-Исследовательских Институтов, Ростов на Дону (Arbeiten der Nord-Kaukasischen Association wissenschaftlicher Institute, Rostow am Don), 1927, no. 24, 232 pp., 4 pls., 33 text-figs. [Russ. with Germ. title.]

This book brings together the present knowledge respecting the economic minerals, including rocks and waters, of the Kuban territory and the Black Sea district north of the Caucasus. Many details not

previously published have been supplied from the field observations of various workers. Materials in the Kuban territory (pp. 9–188) include: oil, gas, coal, graphite, peat, sulphur, Pb-Zn-Ag ores (mainly at Karachai), ores of Cu, As, Hg, Fe, Mn, Cr, Ni, saltpetre, glauber's salt, epsomite, iron sulphates, alums, gypsum, baryte, celestine, halite, borates, bromine and iodine salts, building and ornamental stones, refractory materials, lithographic stone, clays, sand and gravel, granite, diorite, quartz-porphyry, andesite, mica-schist, granite-pegmatite, felspar, serpentine, asbestos, talc, petalite, precious stones, mineral pigments, fresh and mineral waters. From the Black Sea district are described: fuels, pyrite, ores of Cu, Ag, Pb, Zn, Fe, building materials, cement shales (at Novorossiisk), calcite and Iceland-spar, &c. A full index of subjects and localities is added. P. N. C.

Barthoux (J.). *Quelques minéraux du Moroc.* Bull. Soc. Franç. Min., 1925, vol. 48, pp. 226–235.

Brief descriptions are given of pyrolusite from Bou-Arfa; molybdenite and wolframite from Oulmès; magnetite, pyrite, chalcopyrite, blende, smithsonite, bornite, stibnite, mispickel, baryte, chalcostibite from Ghar-el-Anz [M.A. **2**–185]; wollastonite, hornblende, grossular, idocrase, epidote, and graphite from various localities. L. J. S.

Barthoux (J.). *Minéraux du Djebel Debar (Constantine) et leur genèse.* Bull. Soc. Franç. Min., 1925, vol. 48, pp. 99–115, 6 figs.

—— *Quelques minéraux de Constantine (additions).* Ibid., pp. 246–251. 1 fig.

The pockety impregnations in Cretaceous limestones and sandstones consist mainly of scorodite and a white clay (halloysite). The scorodite varies much in character; crystals show the forms *c a b d n i p* [Dana] and (101). Other minerals present are dussertite [M.A. **2**–419], pitticite (analysis of a brown friable crust, As_2O_5 21·15, Fe_2O_3 39·80, CaO 8·50, Al_2O_3 3·60, SO_3 1·99, SiO_2 (insol.) 2·00, SiO_2 (sol.) 0·32, MgO, Cl traces, H_2O 22·61 = 99·97), opal and hyalite, alunite, gibbsite, wad, and jarosite (crystals, *c r s*, up to 2 mm.). These deposits have perhaps been formed by the decomposition in place of mispickel by hot springs.

Nadorite from Hammam n'Baïls near Nador, Constantine, as transparent brownish, thin lenticular crystals of square or octagonal outline showed the forms (103), (501), (130), (510) ?, (15.2.2) ?; measured angles (103): $(\bar{1}03) = 49° 16'$, (130) : $(\bar{1}30) = 48° 13'$, (501) : $(\bar{5}01)$ and (510) : $(\bar{5}10) = 164° 3'$ to $162° 42'$. Blende from Bou-Doucka, as dark yellow

crystals with the forms (100), (110), (502), (111), (6$\bar{1}$1); associated with quartz crystals twinned on (10$\bar{1}$0). From the Ros mine near Robertville, Constantine, are described pyromorphite, baryte, cerussite, and minium. The pyromorphite as small green crystals with a steep pyramid (80$\bar{8}$1).

L. J. S.

Maufe (H. B.). *Report of the Director for year 1926.* Southern Rhodesia, Geological Survey, Salisbury, 1927, 11 pp.

Contains brief indications of the petrology and economic prospects of various districts in Southern Rhodesia. The process of serpentinization of magnesian rocks is discussed. It has been noticed that, at Shabani, chrysotile fibre is only found in serpentine formed from dunite, the olivine-pyroxene-rocks giving no commercial fibre. The sequence of events in serpentinization is worked out, and it is recorded that the nearer the fibre approaches the formula $3MgO.2SiO_2.2H_2O$ the better it is commercially. Extraction of platinoids from the Great Dyke is in operation at the Wedza mine. Tetradymite is recorded in schist at Gwanda; bieberite at the Copper King mine, Lomagundi; triplite at Tchetchenini Hill, Lomagundi; crystallized magnesite at Que Que; and fergusonite at Fort Victoria. S. J. S.

De Lury (J. S.). *The mineral resources of southeastern Manitoba. Rice Lake district. Oiseau River district. Boundary district.* Winnipeg (Industrial Development Board of Manitoba), 1927, 55 pp., 4 pls., 4 text-figs.

An outline of the history, geology, and mineral-deposits in each of these districts. The mineral-deposits are all in the pre-Cambrian rocks. Gold is worked in quartz-veins and shear-zones in the Rice Lake district. Lithium deposits consisting of lepidolite, spodumene, and amblygonite in pegmatite, also with beryl, purpurite, heterosite, tantalite (?), &c., have been found at several places on the Oiseau River district. In the same district deposits of copper-nickel ores are known. [See M.A. 3–129.]

L. J. S.

Cross (Whitman) & Shannon (Earl V.). *The geology, petrography, and mineralogy of the vicinity of Italian Mountain, Gunnison County, Colorado.* Proc. U.S. Nat. Mus., 1927, vol. 71, art. 18, 42 pp., 2 pls., 17 text-figs.

An outline is given of the geology and petrography, and a detailed description of a series of minerals collected in 1885–7. These include 28 species, the more important being silicates from hornfels and lining

fissures at the contact of granodiorite with limestones and slates. Several analyses by L. G. Eakins not previously published are included. Diopside crystals of steep pyramidal habit show a new form (661) [$a:b:c = 1{\cdot}0921:1:0{\cdot}5893$, $\beta = 74° 10'$]. Fine specimens of idocrase are included in the collection. L. J. S.

Eakle (Arthur S.). *Famous mineral localities: Crestmore, Riverside Co., California.* Amer. Min., 1927, vol. 12, pp. 319–321.

A brief account of this locality [M.A. 1–20]. The list of 64 minerals found there includes seven recently described as new species.

L. J. S.

Shannon (Earl V.). *The serpentine locality of Montville, New Jersey.* Amer. Min., 1927, vol. 12, pp. 53–55.

Account of a visit to the old limestone quarry near Montville [in Morris Co.]. The beautiful translucent oil-green serpentine, which occurs as an alteration product of diopside, was described in detail by G. P. Merrill in 1888. L. J. S.

Fisher (Lloyd W.) & Doll (Charles G.). *Notes on the mineral localities of Rhode Island. Part II. Remaining counties.* Amer. Min., 1927, vol. 12, pp. 427–436.

Continuation of a previous paper [M.A. 3–282]. L. J. S.

Ferraz (Jorge Palmiro [i.e. Belmiro] de Araujo) [1883–1926]. *Notes sur la minéralogie du Brésil.* (Traduites, résumées et coordonnées par Alessandro Roccati.) Bull. Soc. Franç. Min., 1927, vol. 50, pp. 6–41.

The author had intended to write a mineralogy of Brazil, but his notes, here translated, are incomplete. In an alphabetical list 108 species and varieties, Acmite to Gypsum (also sulphur and spinel), are dealt with, giving for each the localities where they have been found. Under each mineral the localities are arranged under States. L. J. S.

Little (James Macfarlane). *The geology and metal deposits of Chile.* New York (The Branwell Co.), 1926, ix + 188 pp., 4 pls., 14 text-figs. Price $5·00.

A brief sketch of the geology is followed by a general account of the ore-deposits with respect to their distribution, genesis, form, and classification. The larger part of the book is occupied by descriptions of each

of the 242 mines visited by the author. Of the two maps (scale 1 : 1,000,000) one is geological and the other shows the positions of the mines. L. J. S.

Miscellaneous.

[Chirva (E. F.)] Чирва (Е. Ф.). Скородит из Березовского рудника на Урале.—Čirva (E.). *Sur la scorodite de la mine Berezovskij dans l'Oural.* Изв. Акад. Наук (Bull. Acad. Sci. URSS), 1925, ser. 6, vol. 19, pp. 731–742, 2 figs.

Scorodite from Berezovsk was described crystallographically by N. I. Koksharov in 1870 and 1875. The present author finds the forms a (100), b (010), c (001), n (110), k (340), d (120), g (130), w (140), m (201), e (012), z (052), p (111), s (121), u (131), β (141), x (351), t (532), y (342), A (472), α (272), j (142), v (345)? Of these $g\ w\ z\ \beta\ x\ t\ y$ $A\ \alpha\ j\ v$ are new for scorodite. The forms present on thirteen measured crystals are tabulated, and the axial ratios $a : b : c = 0{\cdot}86785 : 1 : 0{\cdot}961851$ are deduced. P. N. C.

[Dolivo-Dobrovolsky (V. V.)] Доливо-Добровольский (В. В.). Кристаллы тюямунита ($CaO.2UO_3.V_2O_5.nH_2O$).—*Die Kristalle des Tyuyamunits.* Зап. Росс. Мин. Общ. (Mém. Soc. Russe Min.), 1925, ser. 2, vol. 54, pp. 359–376, 3 figs. [Russ. with Germ. résumé (pp. 375–376).]

Minute platy crystals of tyuyamunite from Tyuya-Muyun, Fergana, gave on the goniometer (maximum light reflections) the angles $(001) : (101) = 60\frac{1}{2}°$, $(010) : (110) = 52\frac{1}{2}°$, $(001) : (111) = 70\frac{3}{4}°$, corresponding with the orthorhombic axes $a : b : c = 1{\cdot}303 : 1 : 2{\cdot}337$. The optical orientation is $\alpha = c$, $\beta = a$, $\gamma = b$. For sodium-light $2V = 48°$, $\gamma - \beta = 0{\cdot}028$, $\gamma - \alpha = 0{\cdot}154$. Negative; mean refr. index about 2. The Fedorov complex-symbol is given. P. N. C.

[Rode (E. Y.)] Роде (Е. Я.). О тюямуните и минералах уранитовой группы.—Rohde (E.). *Upon the tyuyamunite and some minerals of the uranite group.* Зап. Росс. Мин. Общ. (Mém. Soc. Russe Min.), 1925, ser. 2, vol. 54, pp. 377–383.

Tyuyamunite from Tyuya-Muyun, Fergana, was freed from calcite by acetic acid, washed in water, and dried to a constant weight over sulphuric acid (sp. gr. 1·05) at room temperature (18–19°). Analysis of this material gave UO_3 56·07, V_2O_5 18·92, CaO 5·08, BaO 0·32, MgO 0·12, Fe_2O_3 0·86, insol. 0·31, H_2O 17·53 = 99·21. Remarks are added on the zeolitic nature of the water in tyuyamunite and other minerals of the uranite group. P. N. C.

[Smirnov (S. S.)] Смирнов (С. С.). Сульфоарсенит свинца, близкий к иорданиту, с Андреевского рудника на южном Урале.—*Sur un sulfo-arsenite de plombe voisin de la jordanite de la mine Andréiev dans l'Oural du Sud.* Зап. Росс. Мин. Общ. (Mém. Soc. Russe Min.), 1925, ser. 2, vol. 54, pp. 21–25.

Jordanite is found as large masses in the Andreevsk mine, in the south-west corner of the Kochkar goldfield, Troizsk district, Orenburg govt. (now Chelyabinsk govt.). Associated minerals are blende, galena, pyrite, mispickle, quartz, calcite, &c. The jordanite forms massive aggregates of irregular platy grains or occurs as a fine impregnation in calcite. Analysis by B. G. Karpov gave: S 17·80, As 9·46, Sb 2·10, Pb 69·85, insol. 0·57 = 99·78. Sp. gr. 6·38. Formula $4PbS.(As,Sb)_2S_3$ with an excess of 0·6 PbS regarded as admixed galena. In the absence of crystallographic data the mineral cannot with certainty be identified as jordanite. P. N. C.

[Smirnov (S. S.)] Смирнов (С. С.). О двух скаполитах с речки Слюдянки.—*Sur deux scapolithes des bords de la rivière Slioudianka (région du Baïkal sud).* Зап. Росс. Мин. Общ. (Mém. Soc. Russe Min.), 1926, ser. 2, vol. 55, pp. 354–361. [Russ. with French résumé (p. 361).]

Scapolite is of frequent occurrence in crystalline limestones on the Slyudyanka river. It also occurs in pyroxene-amphibole-gneiss; with diopside in the contact-zone between granite-pegmatite and crystalline limestone; and in the phlogopite deposits. Crystals ('stroganovite') from the last of these occurrences reach a length of 15 cm. and have been described by N. I. Koksharov and P. V. Eremyeev. Analysis I by Y. V. Moranevsky of 'stroganovite' and II by E. Y. Rode of 'glaucolite'.

	SiO_2.	Al_2O_3.	CaO.	MgO.	Na_2O.	K_2O.	SO_3.	Cl.	CO_2.	H_2O.	Total.
I.	43·65	27·63	18·40	0·32	2·62	0·33	2·25	0·07	2·30		99·58
II.	51·47	28·49	9·40	1·00	6·10	0·51	1·69	0·03	1·10	0·53	100·32

I, also Fe_2O_3 1·47, FeO 0·43, MnO trace, H_2O (at 100°) 0·11, TiO_2, F nil.

	MaCl.	MaS.	MeS.	MeC.	α.	β.
I.	1·75	19·45	6·40	72·40%	1·560	1·590
II.	0·8	51·0	—	48·2	1·551	1·569

P. N. C.

Yoshimura (Jun). *Alkali metals in beryl from Ishikawa, Iwaki province.* Bull. Chem. Soc., Japan, 1926, vol. 1, p. 239. [Japanese in] Bull. Inst. Phys. Chem. Research, Tokyo, 1926, vol. 5, pp. 583–585.

The beryl was found to contain Cs_2O 0·085, Li_2O 0·015, K_2O 0·24, Na_2O 0·49, total alkalis 0·83 %. L. J. S.

Iimori (Satoyasu) & Yoshimura (Jun). *The radioactivity of the rubidium extracted from the lepidolite and zinnwaldite of Japan.* Bull. Chem. Soc. Japan, 1926, vol. 1, pp. 215–219. [Japanese in] Bull. Inst. Phys. Chem. Research, Tokyo, 1926, vol. 5, pp. 73–81.

The following alkali determinations were made. Rubidium was precipitated as chlorostannate, but it still contained small amounts (not exceeding 0·08 %) of caesium.

	Li_2O.	Na_2O.	K_2O.	Rb_2O.
Zinnwaldite from Tanokami	4·24	5·00	7·89	0·81
,, ,, ,, ...	3·66	2·18	7·52	0·98
,, ,, Naegi	2·31	5·82	8·35	n.d.
Lepidolite from Nagatori	2·49	3·20	9·13	0·96
,, ,, ,, ...	1·94	2·70	6·71	n.d.

The β-ray activity of the rubidium sulphate from these two sources was 0·239 and 0·253 respectively, compared with U_3O_8 as 100; for Kahlbaum's rubidium sulphate (probably derived from the Stassfurt salt-deposits) 0·246. It is concluded that the activity of rubidium does not vary with the source of the element; and consequently that the low degree of activity is not due to admixed isotopes. L. J. S.

Iimori (Satoyasu) & Yoshimura (Jun). *Lepidolite from Nagatori, Chikuzen province, and the lithium content of Japanese mica.* Bull. Chem. Soc. Japan, 1926, vol. 1, pp. 237–239. [Japanese in] Bull. Inst. Phys. Chem. Research, Tokyo, 1926, vol. 5, pp. 82–85.

Analysis of pinkish silvery-white fine-scaly mica, intimately intermixed with pale-pink granular quartz, gave: SiO_2 56·79 (48·59), Al_2O_3 21·71 (26·33), Fe_2O_3 0·73 (0·88), FeO 0·14 (0·17), MnO 0·46 (0·56), MgO 0·13 (0·16), CaO 0·26 (0·31), K_2O 6·23 (7·56), Rb_2O 0·96 (1·16), Na_2O 2·45 (2·97), Li_2O 1·94 (2·35), F 4·69 (5·69), H_2O 4·67 (5·66), total less O for F 99·19 (100·00). The percentages in brackets represent the composition of the mineral after deducting about 17 % quartz, so as to give a ratio of 3 for silica to alkalis (except lithia). Alkalis were determined in a number of micas from Japan and weighable amounts of lithia were found in all cases. L. J. S.

Yamaguchi (Yohei) & Takebe (Toshimasa). *Studies on the properties of diaspore and bauxite.* Bull. Chem. Soc. Japan, 1926, vol. 1, pp. 240–244, 3 figs. [Japanese in] Bull. Inst. Phys. Chem. Research, Tokyo, 1926, vol. 5, pp. 17–

The vapour-pressures of decomposition were determined. For diaspore the curve is nearly linear at 400–500°. For bauxite (which gave on

analysis SiO_2 5·4, Al_2O_3 62·0, Fe_2O_3 10·7, H_2O 22·0 = 100·1, corresponding with $Al_2O_3.2H_2O$) there are two curves at 200–340° and 350–450°. The heats of decomposition are calculated, and the specific heat of diaspore was determined as $c = 0{\cdot}2085 + 0{\cdot}000127t$. L. J. S.

Sasaki (Jirô). *The determination of the helium content of some Japanese minerals.* Bull. Chem. Soc. Japan, 1926, vol. 1, pp. 253–254.

The amount of helium given off by heating the mineral (about half the total amount) was for fergusonite from Naegi 0·0021 % (0·12 c.c. He per gram of mineral), for monazite from Ishikawa 0·0027 % (0·15 c.c.), and for beryl from Ishikawa 0·000044 % (0·0025 c.c.). In two other beryls helium was absent. The calculated age of the fergusonite is 90 million years and of the monazite 150 million years. L. J. S.

Matsuura (Jirô). *A consideration of the origin of fibrous gypsum.* Japanese Journ. Geol. Geogr. [1927], vol. 4 (for 1925), pp. 65–71, 1 pl., 5 text-figs.

Three types of fibrous gypsum are distinguished—cross-fibre, slip-fibre, and ball-fibre. The last is obtained artificially as small spherulites grown in gelatin. At Ishigamori in Japan veins of the cross-fibre type with a central parting are common in clay surrounding nodules of gypsum. The material has crystallized on the two walls of crevices as these were gradually opened out. The slip-fibre type is less frequent and occurs only along planes of minor faulting. [Cf. Min. Mag., vol. 19, p. 77.] L. J. S.

Savul (Mircea). *Le métaxite de Liubotina (Banat).* Bull. Sect. Sci. Acad. Roumaine, 1927, vol. 10, no. 8–9, pp. 32–35.

A dark-green serpentine derived from gabbro at Liubotina, a left tributary stream of the Danube, readily breaks up into columns and grinds to fine fibres. On account of the columnar structure it is referred to the variety metaxite. Hardness 3–4, sp. gr. 2·618; straight extinction, γ parallel fibre, mean n 1·565, $\gamma - \alpha$ always less than 0·008; pleochroism feeble, γ pale-green, α pale olive-green. Analysis gave SiO_2 41·69, TiO_2 nil, Al_2O_3 2·08, Fe_2O_3 1·48, Cr_2O_3 0·006, FeO 4·31, MnO trace, MgO 37·40, CaO nil, H_2O (−110°) 0·48, H_2O (+110°) 12·34 = 99·79. The serpentine is veined with aragonite. The frequent presence of aragonite rather than calcite in serpentines is attributed to the presence of magnesia in the solutions. L. J. S.

Rinne (Friedrich). *Milarit und Metamilarit.* Centralblatt Min., Abt. A, 1927, pp. 1–14, 17 figs.

A review is given of the author's previous (1885) work on milarite. Goniometric measurements, photographs of the light-figures, and Laue X-ray photographs made on new material all point to hexagonal symmetry, although optically the crystals are divided into biaxial sectors. Basal plates heated at 750° (' metamilarite ') were also examined. L. J. S.

Linck (G.). *Über Wörthit und Xenolith.* Centralblatt Min., Abt. A, 1927, pp. 145–149.

Examination of an old specimen of wörthite from Peterhof, Russia, showed it to consist of a mixture of needles of fibrolite and grains of topaz with some remnants of andalusite from which the fibrolite was probably derived. Fibrolite was identified in a specimen of xenolite from Finland. L. J. S.

Larsen (Esper S.) & Steiger (George). *Dehydration and optical studies of alunogen, nontronite and griffithite.* Amer. Journ. Sci., 1928, ser. 5, vol. 15, pp. 1–19, 3 figs.

The water-content of these three minerals is variable, depending on the temperature and on the humidity of the atmosphere; and the optical data show a corresponding variation. Dehydration and rehydration curves are given for each, and optical determinations were made on the partially dehydrated material at different stages. Alunogen from Pinto da Canon, New Mexico, consists of white flattened fibres with extinction-angle $c:\gamma = 41°$ on the flat face (010) and straight extinction when on edge; optically positive, 2E 46°, $\alpha(\|b)$ 1·460, β 1·461, γ 1·470. Analysis of air-dried material gave SO_3 37·74, Al_2O_3 16·59, H_2O 44·64, insol. 0·94 = 99·91, agreeing with the formula $Al_2O_3.3SO_3.15\frac{1}{2}H_2O$. The dehydration curve shows a break at 90°, and the material is then optically isotropic with n 1·502. Nontronite from Woody, California, gave analysis I for dark olive-green material filling veinlets in a garnet-pyroxene-rock; when dried it shows a silky lustre and olive-buff colour, with sp. gr. 2·495, H. 2. The material analysed consists of fine fibres with γ parallel to the length; optically negative with small axial angle and strongly pleochroic, α 1·56 (pale-yellow), β 1·585 (olive-geeen), γ 1·585 (yellow-green). Formula $R''O3R'''_2O_3.10SiO_2.9H_2O$. Analysis II is of citron-green nontronite with 2V 66°, α 1·57, β 1·59, γ 1·60, found as streaks and patches in a garnet-hedenbergite-rock at the same locality, and representing an alteration-product of hedenbergite.

	SiO_2.	Al_2O_3.	Fe_2O_3.	FeO.	MgO.	CaO.	$H_2O(+105°)$.	$H_2O(-105°)$.	Total.
I.	47·51	0·37	35·17	nil	1·40	2·50	5·90	7·16	100·16*
II.	43·51	2·94	28·62	0·99	0·05	2·22	6·62	14·05	100·02†

* Including Na_2O 0·09, K_2O 0·06. † Including CuO 1·02.

The published analyses and optical data for nontronite, morencite, hoeferite, and müllerite (=zamboninite) are tabulated and compared, and it is concluded that these are all identical, differing mainly in the variable amount of water present. The formula of nontronite may be given as $Fe_2O_3.3SiO_2.nH_2O$, and this shows a gradual passage to the isomorphous mineral beidellite, $Al_2O_3.3SiO_2.nH_2O$ [M.A. 3–8]. Griffithite [M.A. 1–206]. L. J. S.

Hess (F. L.) & Foshag (W. F.). *Crystalline carnotite from Utah.* Proc. United States Nat. Mus., 1927, vol. 72, art. 12, 6 pp.

Thin crusts of small yellow plates of carnotite line crevices in calcareous sandstone (Lower Cretaceous or Upper Jurassic age) in the La Sal Mts. near Moab. The plates have a perfect basal cleavage and when on edge show a strong pleochroism—greyish-yellow to lemon-yellow. Material dried over strong sulphuric acid and containing 1·32 % H_2O has β 2·06, γ 2·08 (Na), and 2V 50° ; material dried over acid of vapour-pressure 19 mm. and containing 1·72 % H_2O has β 2·04, γ 2·06. Analysis of air-dried material gave: UO_3 65·62, V_2O_5 21·12, P_2O_5 trace, As_2O_5 nil, MoO_3 nil, Al_2O_3 0·16, Fe_2O_3 0·04, CuO,PbO trace, CaO 0·64, BaO nil, MgO 0·22, Na_2O 0·35, K_2O 9·58, H_2O 1·35, insol. 0·32, total 99·40, corresponding with the formula $K_2O.2UO_3.V_2O_5.\frac{2}{3}H_2O$. The Ra : U ratio $2{\cdot}30 \times 10^{-7}$ indicates an age of seven million years. L. J. S.

Larsen (Esper S.) & Foshag (William F.). *Cancrinite as a high temperature hydrothermal mineral from Colorado.* Amer. Min., 1926, vol. 11, pp. 300–303.

Cancrinite of several genetic types is abundant in the Iron Hill area [Gunnison Co.], Colorado. White to colourless cancrinite (D 2·51, ω 1·524, ϵ 1·501) as grains up to 10 cm., associated with monticellite (α 1·653, β 1·669, γ 1·674), idocrase (ω 1·736, ϵ 1·732), titaniferous garnet, &c., forms veinlets in a partly altered uncompahgrite near Beaver Creek. Analysis gave SiO_2 33·64, Al_2O_3 29·82, CaO 8·64, MgO 0·39, MnO trace, Na_2O 15·41, K_2O 0·50, CO_2 6·79, Cl trace, SO_3 0·03, H_2O 4·61 = 99·83. This agrees only approximately with the formula $3NaAlSiO_4.CaCO_3$; a better agreement is given by a mixture of $NaAlSiO_4$ (nepheline), $Na_2Al_4Si_3O_{13}$ (echellite), $CaCO_3$, and H_2O.

L. J. S.

Tarr (W. A.). *Alternating deposition of pyrite, marcasite and possibly melnikovite.* Amer. Min., 1927, vol. 12, pp. 417–421.

A pyritic deposit in Cambrian dolomite near Fredriktown, Madison Co., Missouri, shows radiating or stalactitic groups consisting of alternate layers of crystallized pyrite and marcasite, the layers being separated by a black powdery material. This powder consists of microscopic crystals of pyrite and was originally probably melnikovite (amorphous FeS_2). Marcasite is deposited by acid solutions, pyrite by slightly acid or neutral solutions, and melnikovite by alkaline solutions; and in this case the character of the solution was no doubt affected by the dolomite.

L. J. S.

Bauer (L. H.) & Berman (H.). *Löllingite from Franklin, New Jersey.* Amer. Min., 1927, vol. 12, pp. 39–43, 1 fig.

Small (up to 3 mm.) brilliant tin-white crystals embedded with pyroxene in white limestone showed the forms *m e l s c b z* [Dana's letters for marcasite] and gave $a:b:c = 0{\cdot}5438:1:1{\cdot}130$. These axial ratios (and angles $am = 28°\,33'$, $cl = 48°\,30'$) differ considerably from those previously adopted for löllingite. Analysis gave As 69·80, S 0·21, Fe 29·40 = 99·41, giving the low ratio Fe : As = 1 : 1·78, which is accounted for by the presence of 14 % of the leucopyrite molecule Fe_3As_4. A slightly cobaltiferous mispickel from Franklin gave $a:b:c = 0{\cdot}6702:1:1{\cdot}189$, intermediate between the values for löllingite and for marcasite.

L. J. S.

Shannon (Earl V.) & Short (M. N.). *A reexamination of the lead sulphosalt keeleyite from Bolivia.* Amer. Min., 1927, vol. 12, pp. 405–408.

Wherry (Edgar T.). *The status of keeleyite.* Amer. Min., 1928, vol. 13, pp. 29–30.

A new analysis of the original material [M.A. **2–11**] gave S 23·02, Sb 43·32, As 0·27, Sn 0·18, Pb 29·80, Ag 0·52, Cu 0·64, Fe 0·84, Zn 1·24, insol. 0·60 = 100·43, corresponding with the formula $PbS.Sb_2S_3$ or $4PbS.(Zn,Fe,Cu,Ag_2)S.5Sb_2S_3$. The earlier analysis is also calculated to this formula when 7·74 % of stannite is deducted. Comparative microchemical tests on polished surfaces of keeleyite and zinckenite (from Wolfsberg, Harz) suggest that these minerals are distinct. This conclusion is disputed by E. T. Wherry.

L. J. S.

Stearns (Harold T.). *The origin of a niter deposit near Dubois, Idaho.* Amer. Min., 1924, vol. 9, pp. 135–137.

In crevices in the thin roof of a cave in a recent basaltic lava flow there is now forming a deposit of nitre as a white crystalline crust. Analysis by E. V. Shannon gave KNO_3 98·74, $NaNO_3$ 1·74, H_2O 0·12, insol. 0·24, Cl, CO_2, SO_3, Al_2O_3, Fe_2O_3 traces. The material has been derived from bird guano on the surface above the cave. L. J. S.

Lonsdale (John T.). *Niter and soda niter from Brewster County, Texas.* Amer. Min., 1926, vol. 11, pp. 189–190.

Snow-white, brownish, or greyish nitrates filling crevices in trachyte intrusive into Cretaceous sediments were found close to a spring of fresh water at the foot of Agua Fria Mtn. Near these veins the rock is sometimes kaolinized or silicified. Analysis gave KNO_3 36·29, $NaNO_3$ 36·35 %, with traces of NaCl, $CaCl_2$, Na_2SO_4, $CaSO_4$, and insoluble residue. Under the microscope two minerals—rhombohedral soda-nitre and orthorhombic nitre—were recognized. L. J. S.

Burbank (W. S.). *Additional data on the properties of pumpellyite, and its occurrence in the republic of Haiti, West Indies.* Amer. Min., 1927, vol. 12, pp. 421–424.

A pebble of amygdaloidal basalt from the Limbé river in northern Haiti has the amygdules lined with white albite, then chlorite and pumpellyite [M.A. 3–8], and in the central portion greenish-yellow epidote. The pumpellyite is dark bluish-green and is probably monoclinic with elongation along the *b*-axis: cleavage (001); α 1·700, β 1·707, γ 1·718, 2V 75°–80°, positive; $\beta = b$, $\gamma : (001) = 30–32°$.

L. J. S.

Bruce (E. L.) & Light (Margaret). *Barytocelestite from the Kingden lead mines, Galetta, Ontario.* Amer. Min., 1927, vol. 12, pp. 396–398.

Minute acicular crystals of barytocelestine occur with gypsum in veins of galena, blende, and calcite at Galetta [in Carleton Co.]. Analysis gave $BaSO_4$ 81·5, $SrSO_4$ 18·5 %, corresponding approximately with $5BaSO_4.SrSO_4$. Refractive index β 1·63 for vibrations parallel to the length of the needles (probably the *b*-axis) and α 1·629. The sulphates are probably later introductions into the veins. L. J. S.

Hawkins (A. C.). *Notes on pyrite and celestite from Rochester, New York.* Amer. Min., 1926, vol. 11, pp. 165.

Crystals of celestine with fluorite, and minute crystals of pyrite, are described from the Guelph limestone [M.A. 2–469]. L. J. S.

Fuller (Margaret Bradley). *An occurrence of witherite in the Altyn limestone at Many Glacier, Montana.* Amer. Min., 1924, vol. 9, p. 154.

Witherite in considerable amount was found filling lenticular and irregular cavities (up to 2 feet across) in limestone in the Glacier National Park. The mineral is colourless to pale-buff and translucent; it contains $BaCO_3$ 98·1, $CaCO_3 + MgCO_3$ about $1\frac{1}{2}$, SiO_2 0·14 %.

L. J. S.

Palache (Charles) & Vassar (H. E.). *A note on cyanotrichite.* Amer. Min., 1926, vol. 11, pp. 213–214.

Analysis of cyanotrichite (= lettsomite) from Grandview mine, Grand Canyon, Arizona [M.A. **2**–186] gave SO_3 12·19, Al_2O_3 15·59, CuO 47·50, Fe_2O_3 0·43, CaO 0·11, insol. 1·46 = 100·48, supporting the formula $4CuO.Al_2O_3.SO_3.8H_2O$. The orthorhombic needles are strongly pleochroic, α nearly colourless, β pale blue, γ (parallel elongation) bright blue; α 1·588, β 1·655, γ 1·617, 2V 82°. A note is added that W. C. Lettsom (an ancestor of W. G. Lettsom) was the first benefactor, in 1793, of the Harvard mineral collection. L. J. S.

Goranson (Roy W.). *Aegirite from Libby, Montana.* Amer. Min., 1927, vol. 12, pp. 37–39.

Needles of green aegirine replacing microcline occur along lines of fracture in a syenite-pegmatite dike in the Rainy Creek area near Libby. Pleochroism is faint, α olive-green, β lighter olive-green, γ yellowish-green; α 1·742, β 1·768, γ 1·787, 2V 81°; sp. gr. 3·52. Analysis by H. E. Vassar gave: SiO_2 53·11, TiO_2 2·57, Al_2O_3 1·25, Fe_2O_3 21·73, FeO 1·57, MnO 0·44, MgO 3·97, CaO 5·15, Na_2O 10·22, K_2O 0·18, H_2O 0·27, V_2O_3 nil = 100·46, corresponding with $NaFeSi_2O_6$ 62·82, $CaMgSi_2O_6$ 20·47 %, &c. L. J. S.

Gillson (Joseph L.). *Pigeonite from the Triassic traps of the Connecticut valley.* Amer. Min., 1926, vol. 11, pp. 317–319.

'White augite' occurs with brown augite in the diabase of West Rock, New Haven, Conn. A similar 'white augite' from Lane quarry, Westfield, Mass., gave α 1·695, β 1·698, γ 1·719, 2V 10° 54′ and 24° 16′, $c : \gamma = 45°$. These optical data are near those of pigeonite. The associated brown augite has α 1·701, β 1·707, γ 1·726, 2V 60°.

L. J. S.

Schairer (J. F.). *Lithiophilite and other rare phosphates from Portland, Connecticut.* Amer. Min., 1926, vol. 11, pp. 101–104.

Analysis of lithiophilite from the pegmatite of Strickland quarry, Collins Hill [M.A. 1–172] gave (mean of two): P_2O_5 44·90, MnO 40·13, FeO 5·16, CaO 0·08, Li_2O 8·61, Na_2O 0·49, H_2O 0·41, insol. 0·16 = 99·94. Details of the method of analysis are given. Associated minerals are spodumene, lepidolite, dark bluish-green manganapatite (MnO 8·52%), columbite, albite, quartz, and very small amounts of dickinsonite and hureaulite. L. J. S.

Anderson (Charles A.). *Voltaite from Jerome, Arizona.* Amer. Min., 1927, vol. 12, pp. 287–290.

Voltaite as small (1–5 mm.) black opaque resinous crystals occurs in brecciated quartz immediately above sulphide ore that has been burning for some years in the United Verde mine. Most of the crystals are simple cubes, sometimes with (111) or (110). Under the microscope it is pale-green and isotropic, n 1·604. Sp. gr. 2·75, H. 3. Analysis gave SO_3 47·83, Al_2O_3 6·06, Fe_2O_3 14·34, FeO 8·82, MgO 1·55, K_2O 4·52, H_2O 16·13 = 99·25. The mineral alters on exposure to air to a yellow powder consisting of a mixture of copiapite and coquimbite. Voltaite also occurs in Shasta Co., California, as minute black octahedra (n 1·596) with melanterite in altered pyrite. L. J. S.

Landon (Robert E.). *Roemerite from California.* Amer. Min., 1927, vol. 12, pp. 279–283, 2 figs.

Brown triclinic crystals of roemerite occur as an alteration product of pyrrhotine at Island Mtn., Trinity Co. The sixteen forms noted include three new prisms (120), ($2\bar{1}0$), ($4\bar{1}0$) [Goldschmidt's axes]. α 1·526, β 1·571, γ 1·582, 2V 49°, negative. Analysis gave SO_3 38·30, Fe_2O_3 20·60, FeO 6·94, H_2O 33·40. This and earlier analyses suggest the formula $FeO.Fe_2O_3.4SO_3.12$ to $15H_2O$. The mineral is readily soluble in water and gives an acid reaction. L. J. S.

Lausen (Carl). *Piedmontite from the Sulphur Spring valley, Arizona.* Amer. Min., 1927, vol. 12, pp. 283–287, 1 fig.

Piedmontite replaces felspar and hornblende, and also occurs as rosettes of minute needles along crevices, in an andesitic lava. The colour is cherry-red with strong pleochroism, but sometimes pale-yellow on the exterior, suggesting a later parallel growth of epidote. Mn_2O_3 8·91 %, $a:c = -3\frac{1}{2}°$. L. J. S.

Foshag (William F.) & Clinton (H. G.). *An occurrence of pitticite in Nevada.* Amer. Min., 1927, vol. 12, pp. 290–292.

Pitticite, melanterite, epsomite, haidingerite, and pharmacolite of recent formation are found in the old workings of the White Caps mine at Manhattan. The pitticite forms brownish-red colloidal crusts on the limestone walls; it is optically isotropic, n 1·615 to 1·617. Analysis gave SO_3 17·97, As_2O_5 14·54, Al_2O_3 3·11, Fe_2O_3 34·01, FeO 0·72, H_2O 29·64, insol. 0·41, MgO,CaO traces, total 100·40. The mineral is regarded as a colloidal mixture of arsenate and sulphate of iron.

L. J. S.

Foshag (William F.). *The selenite caves of Naica, Mexico.* Amer. Min., 1927, vol. 12, pp. 252–256, 2 figs.

Caves in the Cretaceous limestones are frequently met with in the ore-deposits of Mexico. Two extensive and wonderful caves in the mines at Naica, Chihuahua state, were visited by the author. They are lined with a profusion of gypsum crystals of various forms and in places of considerable size (up to 4 or 5 feet in length). L. J. S.

Winchell (A. N.). *Relations between properties and composition in the amblygonite-montebrasite series.* Amer. Min., 1926, vol. 11, pp. 246–249, 1 fig.

The more recent analyses of these minerals show an excess of water over the usual formula and $\frac{1}{4}H_2O$ is added. The few available data when plotted show an increase in refractive indices and optic axial angle and a decrease in density from $LiAlFPO_4.\frac{1}{4}H_2O$ to $LiAlOHPO_4.\frac{1}{4}H_2O$.

L. J. S.

Coleman (A. P.). *The anthraxolite of Sudbury.* Amer. Journ. Sci., 1928, ser. 5, vol. 15, pp. 25–27.

A material resembling anthracite occurs in some abundance filling veins which cut across the stratification of the pre-Cambrian slates near Chelmsford, Sudbury region, Ontario. It breaks up into shining plates and cuboidal fragments, and is much intermixed with quartz and pyrite, showing up to 36·5 % ash. Analysis of selected fragments gave C 94·92, H 0·52, N 1·04, O 1·69, S 0·31, ash 1·52 %. The material is referred to anthraxolite and is considered to represent an end-product of the metamorphism of petroleum, which was perhaps of organic origin in the pre-Cambrian seas. [Cf. M.A. 3–220, 307.] L. J. S.

Schwartz (G. M.). *Geode concretions from the Black Hills, South Dakota.* Amer. Min., 1926, vol. 11, pp. 30–33, 1 fig.

Globular concretions $\frac{1}{2}$–6 inches across with knobby surface were found in Cretaceous shales in Whitewood Creek, near Deadwood. The exterior consists of chalcedony, grading inside into colourless or amethystine quartz. The interior may be partly or completely filled with quartz, calcite, ankerite, chalybite, limonite, and haematite. [Compare 'potato-stones'.] L. J. S.

Myers (W. M.). *The mineralogy of some commercial garnets.* Amer. Journ. Sci., 1926, ser. 5, vol. 12, pp. 115–118.

Five analyses are given of garnets, used for abrasive purposes, from New York, North Carolina, New Hampshire, and Almeria in Spain. With one exception, the almandine molecule predominates. Colour cannot be taken as an indication of the composition of a garnet.

L. J. S.

Shannon (Earl V.). *"Blythite" and the manganese garnet from Amelia, Virginia.* Journ. Washington Acad. Sci., 1927, vol. 17, pp. 444–452.

A new analysis of the reddish amber-yellow garnet (sp. gr. 4·153, n 1·794) from Amelia, Virginia, gave: SiO_2 35·76, TiO_2 trace, Al_2O_3 17·38, Fe_2O_3 0·92, FeO 4·90, MnO 37·98, MgO 0·22, CaO 1·66, H_2O 0·58 =99·40. Agreement with the garnet formula is obtained if the manganese is reckoned as MnO 34·86 and Mn_2O_3 3·47 %. The composition then corresponds with spessartine 70·41, 'blythite' 12·13, almandine 11·47, andradite 3·05, grossular 1·81, pyrope 0·81 %. The existence of the 'blythite' molecule $3MnO.Mn_2O_3.3SiO_2$ [M.A. 3–308] could, however, only be established if a reliable method were available for the estimation of manganic manganese in garnet. The low alumina and high manganese oxide shown in an earlier analysis of the Amelia garnet is evidently due to the faulty precipitation of alumina as acetate. L. J. S.

Shannon (Earl V.). *Apatite crystals from Wiant's quarry, near Pilot, Maryland.* Amer. Min., 1927, vol. 12, pp. 408–410, 1 fig.

Minute greenish crystals, previously mentioned as beryl, from miarolitic cavities in albitite (desilicated granitic pegmatite) are shown to be apatite with the forms *c a m v s r x y* [Dana's letters], and ω 1·635, ϵ 1·631. L. J. S.

Shannon (Earl V.). *Vermiculite from the Bare Hills near Baltimore, Maryland.* Amer. Journ. Sci., 1928, ser. 5, vol. 15, pp. 20–24.

A pale-green foliated mineral resembling talc in appearance has been found in the old chromite mines and quarries in serpentine. When heated, it exfoliates like the vermiculites. It encloses some shreds, apparently remnants, of fibrous serpentine or of actinolite. It is optically uniaxial and negative with perfect basal cleavage ; ω 1·545, ϵ 1·525. Analysis gave SiO_2 36·12, TiO_2 0·24, Al_2O_3 13·90, Fe_2O_3 4·24, FeO 0·68, NiO 0·28, MnO trace, MgO 24·84, CaO 0·18, H_2O (>130°) 10·74, H_2O (<130°) 8·20, total 99·42, agreeing with the formula $4MgO.Al_2O_3.4SiO_2.6\frac{1}{2}H_2O$. The analyses and optical data of some other vermiculites [M.A. 3–352] are tabulated for comparison. L. J. S.

Shannon (Earl V.). *Miargyrite and tetrahedrite from the Flint district, Idaho.* Amer. Min., 1928, vol. 13, pp. 18–21, 1 fig.

Large (2 cm.) rough crystals of miargyrite are encrusted with minute crystals of tetrahedrite. L. J. S.

MacCarthy (Gerald R.). *A probable occurrence of native lead near Portland, Maine.* Amer. Min., 1925, vol. 10, p. 332.

Thin sheets of metallic lead were found along joints in gneiss in the cliff at Cape Elizabeth. L. J. S.

Finch (R. H.) & Emerson (O. H.). *Sulphate deposits in lava tubes.* Amer. Journ. Sci., 1925, ser. 5, vol. 10, pp. 39–40.

In the Kilauea crater and in the Kau desert, Hawaii, large tubes through which lava had flowed showed, after cooling, stalactitic deposits of sulphates (gypsum, kieserite, &c.). These had probably been leached by rain-water from the porous lava. L. J. S.

Johnston (William Drumm, *Jr.*). *Marcasite inclusions in fluorite from the central Kentucky barite-fluorite-calcite veins.* Amer. Min., 1926, vol. 11, pp. 174–180, 4 figs.

Rods of marcasite enclosed in fluorite are either of random position or orientated perpendicular to the faces of the cube or rhombic-dodecahedron. The occurrence of marcasite in the veins of central Kentucky suggests that they were deposited at lower temperatures than the fluorite veins of Illinois. L. J. S.

Hawkins (Alfred C.) & Frankenfield (John S.). *Pyrite from Cornwall, Pennsylvania.* Amer. Min., 1926, vol. 11, pp. 252–253, 1 fig.

Crystals of pyrite from a pyrite vein in magnetite showed the forms $a\,e\,U\,d\,n\,o\,p\,r\,t\,M\,s\,R\,\Psi\,Z\,G$ [Dana's letters] (551), and new m_1 (12.4.3), E_3 (15.3.2), E_2 (20.4.1), g_2 (46.11.4), besides a large number of undetermined vicinal faces. One crystal ($\frac{1}{2}$ cm. across) showed forty-four measurable faces. L. J. S.

Thomassen (Lars). *Kjemisk Røntgenspektrografi.* Oslo, 1926. Statens Råstoffkomité, Publ. no. 21, v + 108 pp., 32 figs. (Norwegian with English summary, pp. 102–108). Price Kr. 8.00.

A complete and detailed account is given of the method of detecting chemical elements by X-ray spectrum-analysis [M.A. **2**–49–50], with mention of various new improvements. Tables give the angles of reflection from halite of the rays from various elements. By this method the presence of 0·5 % of an element is readily detected, or 0·1 % with special exposures. The intensities of the lines afford an approximate quantitative estimation. L. J. S.

Putnam (P. C.), Roberts (E. J.), & Selchow (D. H.). *Contributions to determinative mineralogy. Part I: introductory.* Preface (pp. 89–92) by Charles H. Warren. Amer. Journ. Sci., 1928, ser. 5, vol. 15, pp. 89–102, 3 figs.

Lists of reagents and apparatus recommended for a 'field kit' are given, and general remarks are made on the selection of material and general procedure, more especially with reference to micro-chemical tests. L. J. S.

Ulrich (F.). *Cristallographie de la vivianite de Rodna vecche.* Bull. Intern. Acad. Sci. Bohême, 1925, vol. 25, pp. 234–241, 3 pls., 6 text-figs. [See M.A. **3**–49.]

Vendl (Marie). *Kristallographische Untersuchungen an ungarischen Calciten.* Zeits. Krist., 1927, vol. 65, pp. 636–679, 54 figs. [See M.A. **3**–362.]

Schoep (Alfred). *Sur la planchéite et sur la shattuckite. Identité de la composition chimique des deux minéraux.* Bull. Soc. Chim Belgique, 1925, vol. 34, pp. 315–321. [See M.A. **3**–59.]